Volume 2

PM PERSPECTIVES 2006

http://pmperspectives.gsfc.nasa.gov

NASA Project Management Challenge 2006

May 2006

From the PM Challenge Co-Chairs:

We hope you enjoyed NASA PM Challenge 2006 in Galveston. As you may recall, eleven students from the University of Houston, Cy-Fair College, University of Texas at Austin, Houston Baptist University, College of Engineering-UH (main campus) and the University of Maryland attended the conference through the support of Perot Systems. The student volunteers not only gained a unique insight into project management at NASA, but have now put that insight into action with their impressions of PM Challenge 2006 through a collection of thoughtful articles and essays contained in this edition of PM Perspectives. All of the PM Challenge 2006 presentations can be found at: http://pmchallenge.gsfc.nasa.gov/presentations2006.htm

We would like to say a special thank you to Greg Wright, Jennifer Poston, Echele Thomas and Judy Rumerman for their creative efforts in making this edition of PM Perspectives possible.

Enjoy reading this issue of PM Perspectives, and pass it along to your colleagues.

Dorothy Tiffany,
Walt Majerowicz

A Note From the Manager

On behalf of the combined student, government, and industry team responsible for the production of PM Perspectives 2006, I welcome you to the second edition. I was honored to be asked to serve as the PM Perspective 2006 Project Manager. This web-based magazine represents an outreach program which allowed our college student participants to have unique opportunities to listen and talk to some of the government and industry leaders in project management. It was amazing to get their fresh insights on what they heard compared to my own filtered views of our missions and project management challenges at NASA. I urge you to read each of the articles to gain insight on sessions you did not attend, or to get a different perspective on sessions you did attend. Use them as a reminder of what we have collectively learned or still need to learn in the field of project management. Finally, I want to personally thank Dorothy Tiffany and Walt Majerowicz for giving me the opportunity to work with these students.
The students are our future leaders and indeed represent shining lights, willing to someday take up the challenge of managing our complex projects and exploring space.

Greg Wright
Project Manager, PM Perspectives 2006

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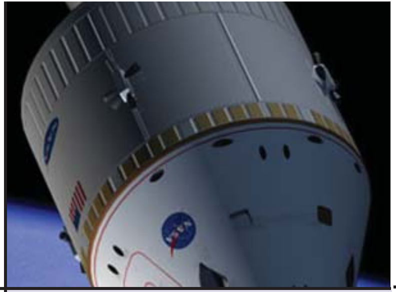

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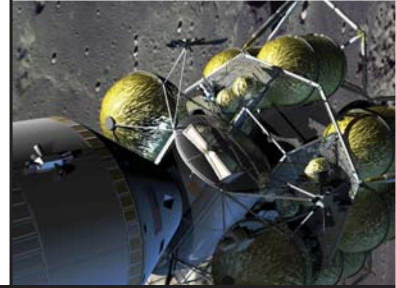

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The True Challenge of Project Management - Mike Griffin

By Greg Wright

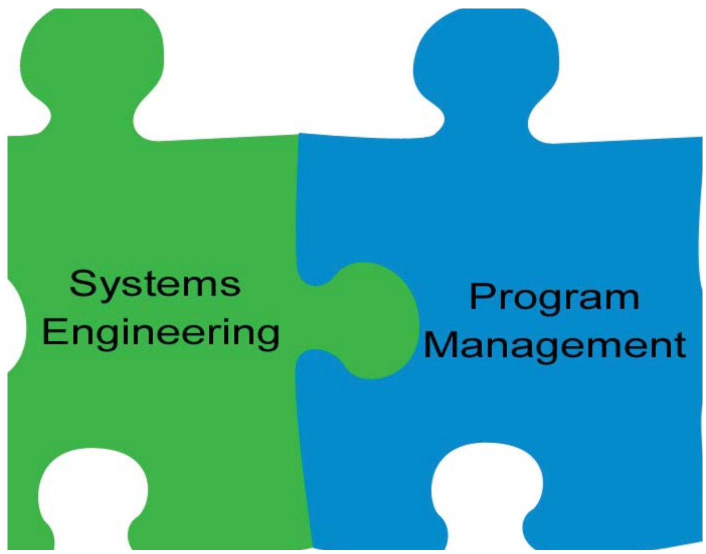
As NASA continues its push to challenge us with bold initiatives mixed with a strong dose of fiscal reality, it is a pleasure to comment on our current administrator, Dr. Michael Griffin. He is a "NASA kind of guy," although looking at him, he carries himself as the executive he must be, red power tie and all. He even stated that one of his first goals was to create a kind of "board of directors," yet another analogy to the corporate side of things. His comments for the PM Challenge 2006 Conference in Galveston centered on his goals and methods to make NASA work better.

Dr. Griffin spoke to the things we have done well. NASA has done well in its set of robotic missions. Many good program managers have come from this background. It isn't because they are better programs; it is because they are development programs. Skilled program managers, just like in any other field, need to practice and hone their skills by becoming experts at management. Programs in the development phase offer the greatest opportunities for this. The dynamic nature of development provides infinite opportunities to practice the basics of program management.

NASA conducts operations of its existing systems well. Despite what may seem an impossible set of infinite compromises, operations continue to deliver. Dr. Griffin pointed out that in his involvement with Space Station redesigns in the 1990s, he and others had the feeling that the assembly sequence was too complicated. The feeling was that one misstep and the whole program would come down. Reality has a strange way of proving you wrong, however. Despite the loss of a Space Shuttle, the construction and operation of the Space Station goes on. NASA's people found a way to operate and sustain the Station despite all odds. We operate one of the most complex systems in the world—the Shuttle. It has capabilities that no other vehicle can match, yet it has a very steep performance curve. It doesn't take much to go wrong before you have a bad day. Our expectations may be flawed (as in expecting too much), but in reality, it is a successful program.

Dr. Griffin then went on to address the areas where we may not have the ideal skill set to accomplish the NASA Vision. We have not developed a large flight system in decades. We as an agency have taken people who have succeeded in other areas at NASA and have thrown them into the deep end of the pool. We have no choice in this matter. The only people at NASA with large-scale flight system development experience (assuming that Shuttle design and development are similar to the challenges we face now) are ready to retire. The reality that Dr. Griffin pointed out is that we have to push these people into the deep end because we have not gone swimming in a really long time. This dearth of previous experience is the major challenge we will have to overcome.

Dr. Griffin continued that systems engineering and project management are opposite sides of the same coin. To talk about one without the other is flawed. The losses of Challenger and Columbia, the Hubble Space Telescope's flawed optics, Mars Observer, Mars Climatology Observer '99, Mars Polar Lander, Genesis—all of these programs' issues were due to failures in program management and systems engineering. They all must be looked at as learning experiences, to learn as much from them as possible so we can repeat as few of them as possible.



So how do we teach the big picture concept? If all agree that the ability to operate at the big picture level is really important, how do we teach it? Dr. Griffin said we can identify the trait, see it in certain young engineers. If we conclude that it is a skill you can't teach, look for those who have it and use them. I am reminded of the idea that you can learn to play the piano, but if you don't have the innate skill it will always be forced, not natural. We need to play to our strengths and play up other's strengths as well. It wasn't so long ago that systems engineering wasn't even considered a formal discipline. Today, there is a body of knowledge devoted to systems engineering and program management. They have been formalized and can be taught. You may not be able to teach how to see the big picture, but you can teach the tools and skills to people to facilitate seeing it.

Dr. Griffin identified several things that are disquieting or in his words “scary” with respect to systems engineering and program management. Sometimes there is a failure to understand the systems engineering is the final gate of “the general ship of engineering.” If the lead systems engineer misses something, odds are that the program manager is not going to catch it, nor should it be his job to do so. Systems engineering cannot be only a set of tools and processes for ensuring that all the system interface requirements are met. They are components of it, but to lose sight of the big picture is a failure of systems engineering. Systems engineering is about asking the right questions, not so much having the answers to all the questions. It is about minimizing the unintended consequences of a design.

In closing, Dr. Griffin acknowledged the reality that NASA exists in a political matrix. This country does things largely for political reasons. NASA or any technical organization cannot be a political one. It has to be solely about identifying and dealing with the truth, be it pleasant or unpleasant. As a program manager, most of what you deal with will be unpleasant truth because all the other stuff has been taken care of. What it all comes down to is that we need to be an organization about knowing and dealing with the truth, and making sure all of those around us feel free to do the same.

Shifting the Project Management Paradigm for Exploration - Rex Geveden

By Alicia Baker

Mr. Rex Geveden, Associate Administrator for NASA, presented “Shifting the Project Management Paradigm for Exploration”. Why would any project manager want to try to manage a large, complex system, such as designing, building, and operating a spacecraft, when you are at high risk of failure from the beginning? How can a large project made of so many subsystems ever get off the ground? Why is such an intricate project like the Cassini spacecraft, on its mission to explore Saturn’s rings and moons, doing so well when the Mars Polar Lander crashed? NASA has two management models that project managers have used through the years—systems management and “faster, better, cheaper”. Because of highly publicized failures, NASA’s approach to project management needs to make the paradigm shift that embraces the best practices of both systems, stated Mr. Geveden.

Mr. Geveden first defined what a project manager does by way of a humorous example. A customer walks into a shop and wants to buy a parrot. The shopkeeper points out three parrots. The first parrot costs $500 and has great computer skills. The second parrot costs $1,000. He has great computer, math, and physics skills. The third parrot costs $2,000 but you never see him do anything. The shopkeeper said the other parrots call him the project manager.

During the Cold War, NASA used the systems management methodology that brought about the success of the Apollo program, enabling the United States to perform the complex task of getting a man to the moon and back. This approach ran on the principles of configuration management and systems engineering. At the time, there was a strong national drive to demonstrate our technical superiority so mission success was a top priority. Predictability of costs was a prime consideration, but total cost was not the dominant concern. NASA simply used cost control modeling techniques to try to control costs. The agency was willing to accept high costs in exchange for high reliability. Systems managers resolved risk by performing risk assessment. They considered risks on every level and tried to prevent unintended consequences. Learned project management skills were used to prevent failures. In human space exploration, the stakes are high and the consequences of failure are great.

After the Cold War ended and the United States had beaten the Soviet Union to the moon, geopolitical factors did not support the systems management approach to project management.

NASA moved to improve schedules and reduce costs. Former NASA Administrator Daniel Goldin adopted the “faster, better, cheaper” approach from the U.S. Department of Defense. This management method was dominated by a desire for cost containment. NASA tried to build smaller, better parts. However, reliability was traded in the attempt to lower costs. Mr. Geveden stated, “When reliability competes with economy, you have problems. When management tries to lower costs beyond a certain incompressible point, it invites failure.” Mission success was a secondary priority. Risk-taking was encouraged. According to Mr. Goldin, not failing meant not taking enough risk. “Faster, better, cheaper” also included a simple management structure that “replaced teamwork with paperwork”. Management was not aware of work performed at lower levels, and this caused problems. Shortcuts undermined the rigor needed to make components work.

NASA had significant successes with “faster, better, cheaper”, including the Mars Pathfinder mission, but then failure rates increased. NASA flew more missions but experienced more high-visibility failures, such as the Mars Polar Lander. Failures not only led to loss of high-value equipment, business, and political prestige, but could lead to loss of life as well. Failures proved that this method did not always work for complex systems.

Mr. Geveden concluded, “Project management is not a take-home exam. You need good people to make good decisions on the spot.” NASA needs to improve its project management, using the best techniques from systems management and “faster, better, cheaper” so the United States can return to the moon before other countries do. “We’re not going to know what we missed until we’re left behind!”, he said.

Tales of Program Management in the Fifth Dimension - William Gerstenmaier

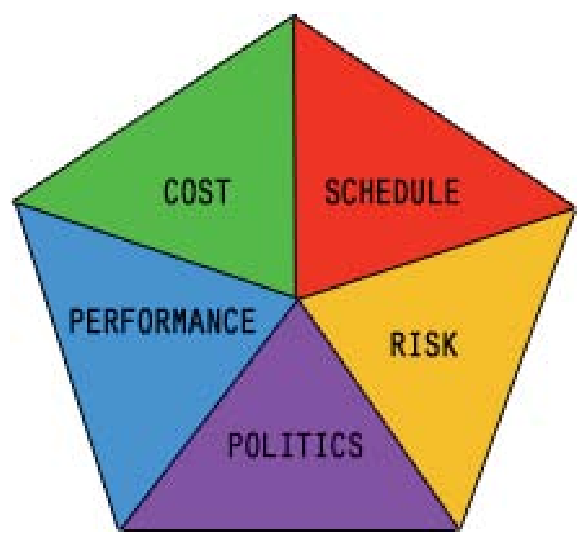
By Katrina MacDonald

William Gerstenmaier, Associate Administrator for Space Operations at NASA Headquarters, presented “Tales of Program Management in the Fifth Dimension”. The five dimensions are schedule, cost, performance, risk (involved in each of the previous three), and politics. Of the five, politics proves to be perhaps the most sensitive facet of program management. In fact, this fifth dimension must be handled on a case-by-case basis, depending on project specifics. In other words, a cookbook solution does not exist that can solve any political problem.

The political dimension can be broken into two major parts: expectations and perceptions. Expectations include what people would like to see resulting from a project or program. Perceptions are what the public does see as resulting from a project. A problem generally occurs when the two do not coincide. A disagreement between these facets may result from poor communication within NASA. Mr. Gerstenmaier explained that NASA needed to maintain a channel of communication from the technical level, through the tiers of management, up to NASA Headquarters, and then from Headquarters to Congress. This ensures that the message NASA sends to the public (or what the public perceives it to be) and the public’s expectations are one and the same.

A chain of communication should be formed from the most technical department in NASA, generally closest to the hardware, through the various leadership levels, and up to Headquarters. As information travels along the chain, it may be translated from a technical focus to a more political perspective. As the information evolves, the appropriate audience members intercept and send it further along. Transitioning of knowledge from technical to political is key to successful dissemination of information. Technical people need not worry about politicking, Mr. Gerstenmaier stated, and as the communication chain progresses, the less people need to concern themselves with the technical details. This chain ensures an effective, clear, and quick method of communicating within NASA.

In the past, projects have been managed in such a way that it was necessary to employ previously used hardware and software. Now, however, NASA would like to switch gears and focus on new project designs in order to encourage new ideas. An understanding of the fifth (political) dimension as applied



to this program management transition, will ensure that both Congress and the public have a positive perception of NASA's projects. This transition entails changing program management from running a project with an operating-intensive approach to a more design-development approach. The project operation approach entails the use of existing hardware and application of previous knowledge. Although this ensured that every detail within the project may be accounted for, this approach tended to stifle creativity and technical progress. The development approach is quite different; it allows for the evolution of new ideas and facilitates more freedom within the project. This, however, makes room for error because proven techniques and equipment are not used. Based on these two approaches, a balanced combination must be found so as to facilitate project efficiency and, in turn, encourage positive public and congressional perception. If a project is perceived as unsuccessful, it reflects poorly on NASA. Ensuring that a project is stable and providing correct information to both the public and Congress contributes to project success.

Perception can be what separates success from failure. Mr. Gerstenmaier presented a practical example. In the early 1800s, the American public perceived the Lewis and Clark expedition as a great success. The explorers achieved what they had set out to do in a fairly timely manner. However, Congress did not share this opinion. It was upset because the cost had been underestimated, and the expedition ended up costing ten times more than originally budgeted. This demonstrated that, although the goals of the expedition had been met, the budget expectations of Congress had not.

An understanding of the fifth dimension, politics, with its public expectation and perception, allows for better appreciation of how a project is accepted. Ensuring that the communication chain is fully functional is crucial in controlling public and congressional perception. Finally, discovering the proper combination of the operation and development approaches in running a project to ensure project efficiency is key to producing a positive perception. By adding the fifth dimension, Mr. Gerstenmaier explained, project management is better served through strong communication between NASA and Congress.

Student Perspective: A "PM Challenge" 2006 Conference Reflection

By Leif Anderson

When conference participants made the trek between the Moody Gardens conference rooms and the connected expo halls, we passed a memorial to lives lost from the Galveston area in the Vietnam War. The memorial consisted of a square array of granite columns with triangular bases. Each column, sized the same as the others, represents three lost soldiers (one individual per side). Looking at them diagonally, though, the foundation seems to sink as more columns are seen across the horizontal plane. The farthest column has the same physical mass as the first, but its location makes it seem heavier than the others. I believe this design feature represents a fundamental concern for project management at NASA.

The risks associated with space exploration can be as grand as the goals. The agency knows tragedy along with the rush of elation. When NASA undertakes a project, all risks, regardless of size (and perhaps in reality the same size), dynamically weigh on the possibility of a mission's success. I had the opportunity to learn more about what measurement techniques in project management control cost and schedule and mitigate risk and how they affect an organizational effort. I also learned something of the experiences of veteran project managers…knowledge that can only be gained applying the techniques at the right time, in the right settings throughout a career. Outside the meeting rooms was the anecdote to why project management know-how is necessary.

The sciences enabling space exploration complicate the risk equation for project management. It seems prudent to adopt a scientific approach that manages all the stakeholders' concerns and, to that end, most of my studies are devoted to understanding various methods. However, thanks to my participation in the PM Challenge conference, I have a stronger appreciation of the art of project management and the work the NASA community contributes.

NASA APPEL: Meeting the Integration Challenges of Project and Engineering Leadership - Ed Hoffman

By Katrina MacDonald

Mr. Ed Hoffman, Director of the Academy of Project/Program & Engineering Leadership for NASA, presented "NASA APPEL: Meeting the Integration Challenges of Project and Engineering Leadership." The entire aerospace industry faces the challenge of integrating engineering and project leadership.

The great challenge confronting the APPEL program is one of integration. While the field of project management includes only one community, Dr. Hoffman said, leadership roles in engineering encompass more than 100 disciplines. Therefore, it is difficult to ensure knowledge is being passed along to the program candidates. Dr. Hoffman spoke of a solution in which APPEL provides the necessary tools for training, while each NASA center manages program curriculum based on customer needs. This allows employees to not only have the opportunity to gain the training necessary to become a knowledgeable leader but also ensures the entire spectrum of engineering would be covered.

Both the program structure and curriculum were explained as well as how these apply to engineering leadership. APPEL provides the foundation necessary for every candidate. Each NASA center then identifies what it needs from the program by assessing customer input to ensure the skills being passed along are actually of value to the candidates.

The curriculum for engineering leadership was also discussed. The four-tier program begins with a foundation level that explains NASA culture and vision, and industry language, among other information useful for an aerospace employee. This course is currently required for all disciplines. As the candidate completes each tier, he or she progresses to a more field-intensive tier until the training is completed.

The session attendees were concerned about incentives for participating in the training program. They wanted to know why someone should devote so many hours to these courses. Pay grades and certifications were discussed as well as other, less tangible incentives. Historically, the program was "individual-driven" because each candidate knew he or she was being groomed for leadership. This meant that they had become important to management. Another incentive to participate was that, upon program completion, each person knew he would have gained the skills essential to becoming a strong leader. Although not what they might have expected, the session attendees seemed to be satisfied with this explanation.

A great concern to current aerospace management is that the emerging engineering leadership develop the proficiencies needed to take the reigns. The APPEL program has faced this issue by integrating program/project and engineering leadership to ensure that each individual successfully completing the program has gained the training needed to fill the shoes of the leaders of today.

The Hubble Experience: Working in a Multiple Center Environment - Frank Cepollina

By Leif Anderson

Frank Cepollina, Deputy Associate Director, Hubble Space Telescope Development Office, who presented “The Hubble Experience: Working in a Multiple Center Environment”, has a message for project managers that is short and sweet: collaboration is part of NASA’s history and should be used to secure its future. Cross-functional teams represent different fields of expertise and different locations, and government coalitions are consistently used to contribute to the success of a project and mission. The dynamics of this work environment includes improved communication, a larger variety of inputs, and stronger problem resolution taking less time. When two or more centers work together, establishing trust at all levels of the team is critical, from the executive, to effective team leaders, and the qualified team members.

Mr. Cepollina cited the advent of modular spacecraft design as the basis for multiple-center participation, characterizing the current state of systems engineering. Modular spacecraft have also facilitated on-orbit servicing of a number of commercial and governmental satellites, repairing or improving instrumentation. Servicing, a critical phase in a program, takes the accumulated resources expended in technology research and development and determines whether a spacecraft is viable. Should the servicing mission fail, the resources expended in the past become sunk costs, and any further opportunity to gain scientific knowledge is lost. A well-known example and success story for multi-center initiative is the Hubble Space Telescope, which has drawn upon resources from NASA centers at Goddard, Kennedy, Johnson, Marshall, Glenn, and the Jet Propulsion Laboratory (JPL). Thirteen years ago, Hubble received a new camera and optical correction engineered at JPL to revive the impaired telescope. Hubble is by far the most productive mission today in terms of references in journals and publications.

In an organization driven by science and technology, NASA project management always has a strong incentive to work in highly integrated cross-functional teams. However, it is during trying or troubled times that the need for collaboration is greatest. This is never more apparent than when NASA has been scrutinized in the public arena – often the result of unexpected events or “unknown unknowns”. At this point, Mr. Cepollina recommends that “egos be checked” and “badges left at the gate” to allow true collaboration among multimember teams spanning all centers and companies in pursuit of a common goal. Lowering inter-center barriers to open communication, developing a management style akin to strategic alliances, and using symbiotic relationship-building allow a center to deliver what was planned. This management style meshes with continual improvement partnerships that have worked in the past should be rewarded with more work.

The key to building partnerships in a multi-center environment is to understand that at its base, it is a buyer/supplier relationship. For Hubble, Mr. Cepollina stated that Goddard Space Flight Center (GSFC) sometimes acted as “subcontractor” in the collaborative relationships it enjoyed with other centers and with contractors. The advantage of this (informal) role lay in the use of value engineering to improve quality and lower costs. In certain cases, GSFC enjoyed added benefits relating to the delivering of stakeholders’ expectations and technology transfer. Unique and creative solutions were required to service Hubble, and the lessons learned were invaluable to GSFC. However, benefits accrue across the board, and the collaborating centers can assume receiving reciprocal support from Goddard in the long term. These are tradeoffs, and for a strong relationship, this is where trust comes into play.

Since the collaborating partner carries expectations, it is by no means a stretch to consider it a stakeholder. Furthermore, GSFC acted as the buyer in the long run and because GSFC sourced expertise from the other NASA centers, the initial project requirements for the Hubble servicing mission began to adopt a supply management perspective. The professional goal of Early Supply Management Involvement focuses on continuous improvement of the development and management of a project and interacts with systems engineering to ensure effective requirements definition in the design phase. Problem areas in the cross-functional team are documented to arise from insufficient or otherwise incompatible requirements. Collaboration during Hubble might not have taken this approach but is mentioned to illustrate another important area where trust is critical with a project in a collaborative relationship.

Through lessons learned with HST, and specifically the servicing missions, NASA projects can add value to implementation through collaborative relationships, strategic alliances, and cross-functional teams—and do so with confidence. In all cases, such a work environment will require compromise from all parties to understand one another’s culture and build trust. This final aspect, trust, can never be taken for granted but once achieved, the work environment for collaboration is in place.

Project Management Tools and Tactics: Why is Project Management Like Playing Whack-a-Mole? - Joe Rothenberg

By Leif Anderson

Mr. Joe Rothenberg, President of Universal Space Network, presented "Project Management Challenges, Tools and Tactics: Why is Project Management like Playing Whack-a-mole"? Through his experiences with the International Space Station and Hubble Space Telescope missions, Mr. Rothenberg has come to identify the project manager as a team leader, not simply an implementer, who treats all project stakeholders as partners in the decision process. This leader demonstrates an ability to
1) understand and control the environment of project/program requirements,
2) anticipate the reactions of stakeholders, and
3) conduct active management. To paraphrase Mr. Rothenberg, this last quality reminds the project manager that "you have to whack fast to catch the most moles."

Lessons learned and project experience will give the next generations of engineers the knowledge required to understand the many types of project environments. You often hear, "An effective leader is goal-oriented". This is as true of the team leader in a project as it is to a seasoned politician, but the successful project manager is also exceptionally pragmatic. This quality allows the project manager to champion the fundamental tools - which mitigate risk, measure earned value, and estimate time - to get the requirements nailed down and a clear picture of the mission goals. The result is alignment with systems engineers working toward a refined design.

Mr. Rothenberg warned against risks associated with the "faster, better, cheaper" image of mission success. Like these words, "scope, time, and cost" can sometimes rub up against environmental subtleties and cause friction. Mr. Rothenberg also stated that perception is often the same as reality, and suggested that the project manager needs to balance competing interests. The notion of public demand alone has many separate, competing perceptions. They can be negative, but these are pictures of success too—to beam as a star among the night sky with the Space Station or to send crews back to the Moon, or to Mars. A mission "supplier" then operates in what could be called an image-conscious market to define perception. Not delivering on scope indicates that a project in one way or another is uncontrollable, but the point of image-refusal is devastating to a mission. Decisions are made in the image-conscious market on behalf of all stakeholders that either drain resources and morale or recapture imagination, interest, and a unified enthusiasm for seeing the project through the project manager's eyes.

Taking an active management role should force the project manager to separate different job functions and apply different management styles. A project manager with strong motivational-skills (fun, engaging) and technical knowledge is apt to build the right team. Furthermore, a clear plan is essential. The project manager determines boundaries and works out the timeframe. This is the start of a successful project. The good leader makes tough decisions upon a thorough understanding of the residual effects of project risks. The value of risk, weighing human vs. robotic, Crew Exploration Vehicle vs. nuclear-powered probes, or Shuttle vs. expendable launch vehicle, can translate into different variations of acceptability. In this way, objectively evaluating the environment allows project management to
1) apply marginal cost and scheduling controls to try to avoid residual effects, and
2) identify with the stakeholder what is required for minimum mission success.
But to go beyond, the project manager must learn to anticipate the reaction of stakeholders. This requires knowing institutional dynamics and the total cost of ownership - priority for the program is typically directed toward funding. Active management strives for a plan of attack with accurate cost-models.

All of these issues roll-up into "Whack-a-Mole" project management. Mr. Rothenberg presented the complexities of agency life cycles in a concise list because what the issues represent: "understanding environments", "anticipating stakeholders", and "active reviews", come from his years of experience and knowledge of successes and sunk costs. Though, you could also say that Mr. Rothenberg was doing as he preached: communicating the plan, method, and successful vision for space exploration.

The Impact of Fear on Project Success - Frederick Manzer

By Simon Sarkis

Dr. Frederick Manzer, Director of Project Management for Strategy Bridge International, Inc., presented “The Impact of Fear on Project Success”. Do you or any member of your team have enissophobia (fear of criticism), decidophobia (fear of making decisions), kakorrhaphiophobia (fear of failure), catagelophobia (fear of being ridiculed), or katagelophobia (fear of being ridiculed)? Although fear is often disparaged in our culture, Dr. Manzer, a very charismatic speaker, strongly believes fear is the source of many problems in developing and implementing a project plan. His presentation examines the source and impact of fear in the execution of projects and proposes solutions to reduce its consequences.

The typical project management culture today focuses on objectives - meeting cost and schedule with the required performance. What if, however, it is impossible to meet the cost or schedule during the completion of a task or project? In this situation the culture and leadership determine the outcomes. In a “no excuses” or “blame the messenger” environment, fear grows and leads to self-protective behaviors. These behaviors cause communication between the performers, the management team, and the stakeholders to deteriorate. When people are blamed for identifying problems, they just “don’t identify them”. Dr. Manzer stated that in a strong “objective-oriented” environment where failure is not tolerated, problems are hidden until it is too late to fix them. This environment prevents honest communication and problem-solving among leaders, stakeholders, and system managers from taking place before “trash the project” happens.

The alternative is to eliminate finger pointing and focus the team on succeeding rather than on “not failing”. Dr. Manzer suggests “Help me understand the problem, promise me an honest answer, and owe the project nothing but the truth and your best effort, I (the project manager) shall eliminate the risk, …risk becomes my responsibility to manage…allow me then to take the blame if I do not.” He adds, “A manager has nothing to sell but a promise.” A project manager’s job would be to promote accountability for efforts, performance rather than inputs, honesty, suggestions, and to support improvements between his team members. Therefore, with wisdom he shall decide and manage responsibility for results. In this manner a project manger can drive out fear from his organization, because just like a fearless rock climber, fearless people have no limits and accept impossible objectives.

“Fear is a tyrant and a despot, more terrible than the rack, more potent than the snake.” - Edgar Wallace (1916) Knowing that every success has a possibility of failure, driving out fear becomes a “must” rather than “why not”. By focusing on imagination and prevention rather than correction, success becomes possible. Concluding his presentation, Mr. Manzer insisted that “people” should feel safe in identifying their fears, concerns, and risks to their leaders. On the other hand, Mr. Manzer urged every project manager to reward individuals who do their best and to never punish honesty. A project manager should always foster an environment of opportunities for personal growth and organizational success.

Seven Key Principles of Program and Project Success - A Best Practices Survey - Vincent Bilardo, Jr.

By Aleks Borresen

Mr. Vincent Bilardo, Jr., a Project Manager at the NASA Glenn Research Center, presented the "Seven Key Principles of Program and Project Success - A Best Practices Survey". This speech was presented by Mr. Bilardo, but much of the content was developed by a board called the Organization Design Team (ODT), of which Mr. Bilardo was one of the co-chairs. The ODT consisted of people from different NASA centers as well as a broad spectrum of NASA contractors. This board investigated past successes and failures at NASA on a plethora of projects, such as, Apollo, the K-1 launch vehicle, the Virginia Class Nuclear Submarine, and the X-38.

Mr. Bilardo's presentation centered on the seven key principles the committee learned from studying past programs and projects executed by NASA, the Department of Defense, and the commercial sector. These principles should be used together to assure a project runs as successfully as possible.

At the outset, Mr. Bilardo talked about establishing a clear and compelling vision for your project, the first key principle. The best example of this is the Apollo program in which President Kennedy set the objective of landing a man on the moon and bringing him back. This is the perfect example of a very clear and straightforward goal that is incredibly compelling.

Second, every project needs a top protector, in other words someone at the top who will fight for the project's existence and funding. Again, the best example of this is the Apollo program. President Kennedy, and later President Johnson, continually fought to provide the necessary resources to fuel the accomplishment of that clear goal and compelling vision.

Third, projects need strong leadership and management. To achieve this, a project must have a clear timeline, a sufficient budget, efficient time management, and a high ethical position. All of this, in conjunction with sound project management, creates a project that has both strong leadership and management. Some industry examples of such successes are the Apollo program, the F-117A project, and the Virginia Class Submarine.

Fourth, every project needs communication to be wide open (all the way up and down the line). To promote this, a project manager should remain approachable to all for problems, praise in public but scold in private, and keep the project entirely transparent. Communication should be face to face (when possible) as opposed to communication through e-mail. There have been several NASA and Department of Defense examples of impeccable communication during projects.

Fifth, developing a strong organization is imperative. This is accomplished through the use of small teams and by creating rewards and incentives for jobs well done (if company policy and laws permit this).

Sixth, a program needs to manage risks and those inevitable unexpected problems that arise. One successful method is prototyping earlier and more often, using both simulation and testing.

Seventh, implementing both effective systems engineering and integration is vital. To achieve this, develop a clear set of top-level project objectives, establish and control the requirements needed to achieve the objectives, and then focus on execution.

In conclusion, during a project, certain key principles need to be followed to maximize success. These principles include: establishing a clear and compelling vision, securing a top protector, establishing strong leadership and management, creating wide open communication, developing a strong organization, managing risks, and executing effective systems engineering and integration. If these seven key principles are practiced correctly, then project success should follow.

Choosing Leaders - The Key to Success - John Baniszewski

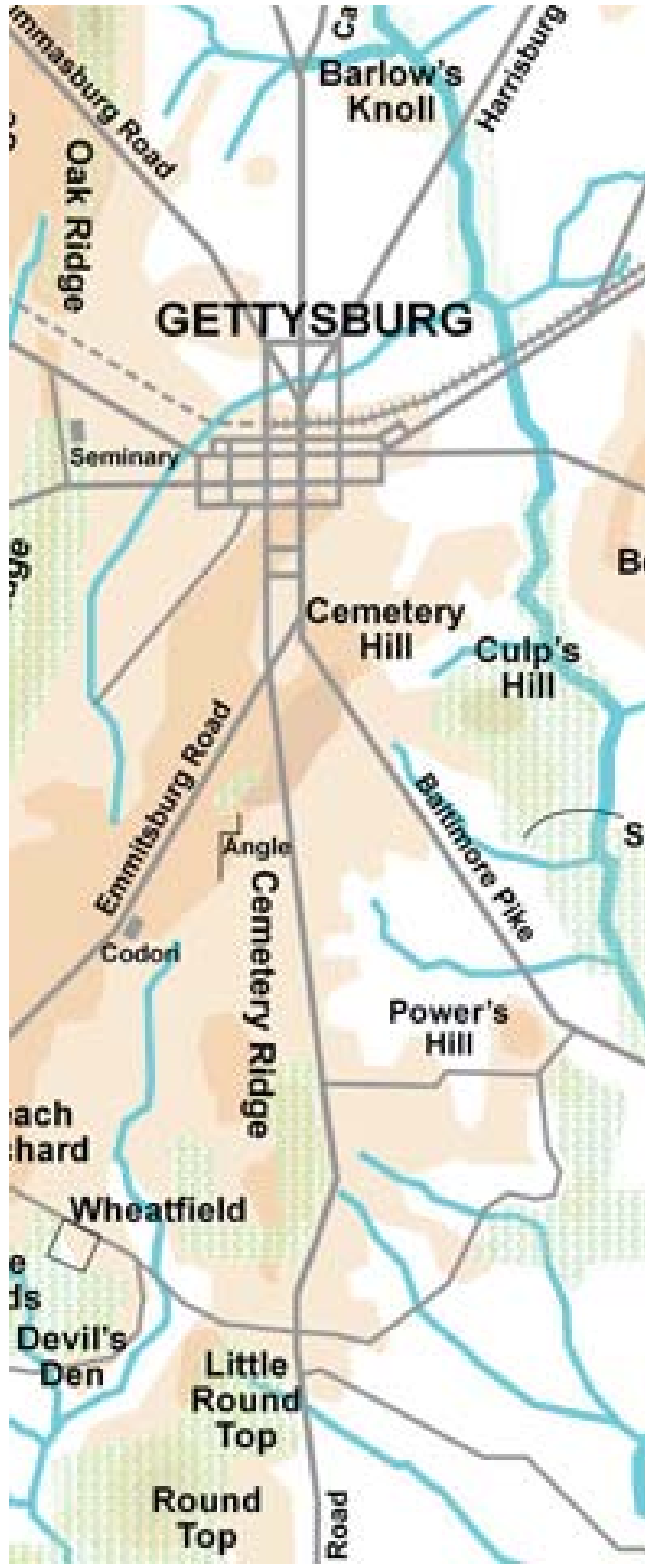
By Aleks Borresen

Mr. John Baniszewski, the Deputy Project Manager for Resources for the Exploration Communications and Navigation Systems Project at NASA's Goddard Space Flight Center, gave an excellent presentation on "Choosing Leaders - The Key to Success". He began his presentation and commanded the attention of the audience by involving them in an interactive case study on leadership choice. Mr. Baniszewski presented to the audience Pat and Chris, two very different individuals currently in leadership positions. The audience was now Pat and Chris's boss, and had to decide what to do in similar yet different situations. After getting mixed opinions from the audience on what route to take, the talk moved on to the Civil War.

One may think. What does the Civil War have to do with choosing leaders or even with project management? Here's the catch - Pat and Chris turned out to be the commanders for the North and South armies at the Battle of Gettysburg during the Civil War. Mr. Baniszewski went on to portray the battle with elegance and accuracy, ending with a moral. As a project manager, one needs to pick the right leaders for the right jobs. One simply cannot put an inexperienced leader (with potential) in charge of a huge, highly complex project as a means of developing his potential. One needs to choose experienced leaders with well-established skills for such projects. Furthermore, as a project manager, you need to trust experienced employees' judgment (sometimes maybe over your own).

By using this case study, Mr. Baniszewski focused on an interesting point, one discussed greatly at this conference. Project managers must use the past to influence the present, especially at times of trouble during a project. Chances are that out of 650 total launched missions at NASA, similar issues arose in some past project. Any one of these past missions could hold the answer to a problem currently plaguing your project. Some of the many ways to make use of history are: develop a Lessons Learned Information System, network with other colleagues about issues, put experienced leaders in charge (they might have already been exposed to such issues), and attend conventions and swap "war stories".

Ultimately, Mr. Baniszewski closed on the thought that in order to succeed in project management, as well as in projects in general, two things must be present: choosing the right leaders for the right projects, and whenever problems are encountered, one should study NASA's project histories for the solution.



Observations, Ideas, and Opinions: Systems Engineering and Integration for Return to Flight - George Gafka

By Frank A. Thomas

George K. Gafka, NASA's chief engineer and system engineering and integration lead for the Tile Repair Project during the Space Shuttle's Return to Flight after the Columbia accident, gave the presentation "Observations, Ideas, and Opinions: Systems Engineering and Integration for Return to Flight". He discussed the development of a tile repair system for the Space Shuttle and the decision process behind its development. Mr. Gafka began with the process of defining the mission objectives followed by the team roles and responsibilities. He then reviewed the guidelines developed for using the repair procedure as well as the technical difficulties that arose in developing the repair system. Finally, Mr. Gafka discussed the deployment of the repair system aboard STS-114, the Return to Flight mission.

In defining the requirements for the tile repair project, the main consideration was to decide what could be accomplished and what could be ground-validated before flight. These realistic judgments helped define performance boundaries for individual and integrated systems. Mr. Gafka stressed throughout his presentation the importance of people skills, teamwork, and integrity. In defining the roles of team members, it is paramount to know that the team members are dependable.

Of all the requirements that were laid out, perhaps the most critical was for the analytical tools that would help decide if a repair should be done. This decision balances the risk of letting a damaged area go unrepaired against the risks and uncertainties of making the repair and introducing unknowns into the system. Mr. Gafka's team was forced to make some assumptions regarding real-time data. These assumptions were tested against historical data for Space Shuttle tile damage, and the inspection criteria were further refined. Using this historical data, the team could assess the performance from a conservatism perspective of its analytical tools.

The actual tile repair system developed by the team involved a two-part "goo" product that could be mixed on orbit and applied to a damaged section of the tiles. The benefit of this system was its adaptability to various damage geometries. Unfortunately, testing proved that the goo expanded during vehicle reentry. This presented a problem: a piece of repair material extending past the outer mold line of the tile surface would change the airflow and increase local and downstream temperature during reentry. The astronauts would need to apply the goo below the surface of the tile, further complicating the process. Also, dispensing the repair material in vacuum conditions resulted in bubbles that could not be completely eliminated. This required more study of the bubbles to understand potential undesirable repair performance caused by the bubbles.

In the end, the goo product was deployed on STS-114 as a "best-effort" system. The Tile Repair team also developed a set of "use-as-is" analytical tools and a historical database to be used as a "sanity check" for the analytical tools' predictions. On the STS-114 mission, the team actually handled a real-time problem of protruding tile gap filler. The same type of risk assessment was used in diagnosing and resolving that problem.

Mr. Gafka concluded with a discussion of people skills, stating that while engineers need a high level of "hard" technical skills, project managers are more in need of "soft" people skills. He said that the key to success lies in knowing your goals, knowing how to get there, and enjoying the journey as much as possible.

Does a Good Engineer Make a Good Project Manager? - George Andrew

By Alicia Baker

Mr. George Andrew, senior associate for Booz Allen Hamilton, presented “Does a Good Engineer Make a Good Project Manager?” Mr. Andrew debunked the myth that all good engineers make good project managers. “Just because he or she is a good engineer, why do they think they will be a good manager?” Andrew explained that in his 27 years of experience with satellite and launch vehicle systems engineering and project management, he has observed that there are certain types of engineers and certain types of managers. In reality, only in some instances will an engineer grow into a good leader.

What kind of engineer are you? Do you like to look at the “big picture” or focus on the littlest details? If you like to make sure the “big picture” gets completed, then you are a systems engineer. If you like to “start from the bottom up” and pay attention to the design of a circuit board versus where the board fits in your system, then you are a detail design/analyst. Which type of engineer makes a good project manager?

Systems engineers understand the “big picture” but they can also can get down to details to understand what the detail design engineers are doing. They develop the system-level requirements to be completed by the detail design engineers. Michelangelo was a good systems engineer. He understood the details of the design of a system when he sculpted the statue of David as well as the “big picture”. When he chose a piece of marble to sculpt, he believed he was only releasing the sculpture that was already inside the marble. He could see what was already there! A good project manager “hacks at all the chunks” to create a polished finished product. A good systems engineer needs to be able to multitask, understanding the details and bigger picture at the same time-hacking away at the chunks while working to create a polished, finished product.

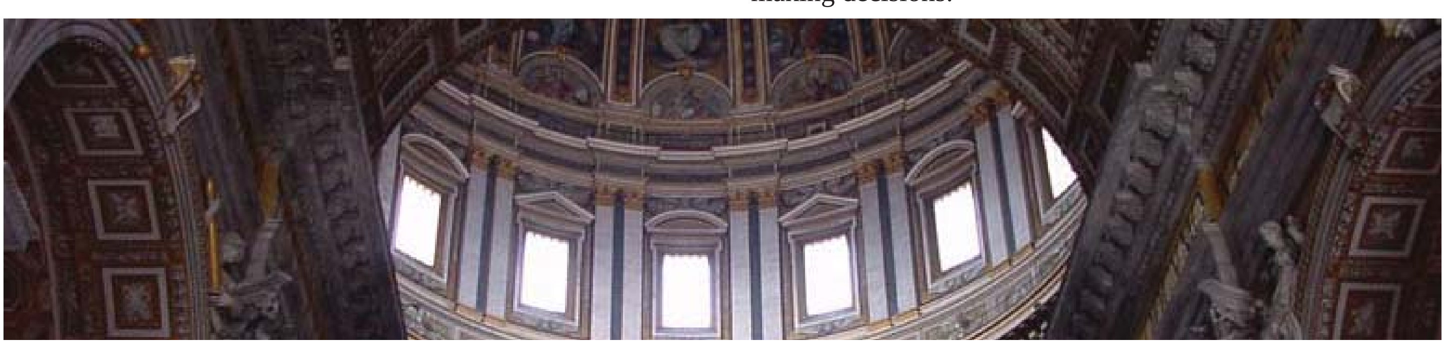
Detail design/analyst engineers work with the systems engineer to create the subsystems and detailed design requirements. Michelangelo was a good detail designer as well. While painting the Sistine Chapel, he lay on his back only inches from the ceiling to paint each separate piece of the picture, each finger and toe, but he had to keep the entire picture in mind. A good design engineer needs to be able to multitask in the same way.

Physiologists and neurologists have determined through numerous studies that males and females are hard-wired differently and tend to possess different qualities that could make them or not make them a good leader. Men are serial thinkers; they like to finish one task before going to the next. Women are parallel thinkers; they can work on more than one task at the same time, so they tend to be good multitaskers. Does that make them better managers? What do you think?

Which type of engineer makes a better manager? Andrew has seen that both systems and detail design engineers can become good managers. Systems engineers who know how to focus on the “big picture”, but can dive into the details, can make a good leader. Design engineers who can focus on details, but step back to look at the “big picture” and be capable of multitasking make good managers. Good systems engineers typically make good project managers because they can see the “big picture”. Good detail design engineers usually make good subsystem leads.

What types of managers have you observed in your workplace? Have you worked for a micromanager? Their management style is based on control. They never delegate work because they always have to do “it” themselves - whatever “it” is. “Hands off” managers let fear rule them. They don’t trust their own decisions so they delegate responsibilities to others so they don’t have to do “it” themselves. Have you actually had a leader that tries to empower others? They “lead from behind.” They delegate with one eye open. They give work to people who they believe will do a good job and they mentor to make sure the job is done right.

What type of manager makes the best manager? The “lead from behind” person tends to make the best manager. They make you look good as well as themselves. They are team players because they work well with others. They empower the people around them and mentor them. They feel secure in making decisions.



What's the tie in? Good engineers know how to multitask. They have the ability to focus on the details as well as the "big picture." While designing a circuit board, they consider the time that they may need to consult the parts manufacturer for components. They are team players. They believe in empowering and teaching others through mentoring. They have the confidence to make decisions.

Why don't all good engineers become good managers? Sometimes engineers have trouble leading people. They are used to making decisions on a small scale. As a manager, they are responsible for decisions on a grander scale. They are responsible for the cost and schedule of the whole system - the "big picture" - not just the circuit board. They may be fearful of taking on more responsibility because they may not have been mentored or trained on how to make good decisions for a big project. They may have difficulty with change and try to control everything in order to minimize the change. But if you can think like a good systems engineer and "lead from behind," you might make a good leader! Andrew concluded by saying, "Some people just aren't naturally a good project manager."

What's Going Wrong? - Brent Robertson

By Sahar Rasolee

Brent Robertson, Observatory Manager at NASA Goddard Space Flight Center, presented "Solar Dynamics Observatory: A Team Approach to Risk Management." Everyone uses risk management in one form or another in their daily lives. The Solar Dynamics Observatory team takes this a step further. I walked into Brent Robertson's session having no clue what to expect. Would I understand this subject, being a Journalism major at the University of Maryland? The subject seemed to be a far cry from my studies. Yet perhaps it wasn't such a far cry after all.

Webster's dictionary defines risk as "the possibility of suffering loss". NASA takes this five-word definition and expands it to fit its own projects and programs. Basically, risk management is the calculation of setbacks, such as budget deficiencies and schedule changes, and the consequences and impacts of these setbacks. For example, if the schedule slips, how will that affect the project or program? A risk manager's job is to determine all the possible consequences, from budget to environmental issues, associated with this slip in the schedule.

So how can I relate to that? I guess I didn't walk into the session completely unaware of what I would learn; my mom was a risk manager at one point in her career, so I knew a little bit about it. However, Mr. Robertson's session opened my eyes to the fact that risk management can be studied and analyzed to the smallest degree and risk management is NASA terminology for a process people go through every day, whether they know it or not.

Risks are a part of everyone's lives. We all weigh the pros and cons of a decision before diving headfirst into it. Buying a new car? Maybe you want the most luxurious car around. In that case, you'd have to be willing to spend the money for the car, which means you'd have less money to spend elsewhere, like at the supermarket or when paying the monthly bills. Ultimately, you could end up in heavy credit card debt, damaging the credit you've worked so hard to build up since you turned eighteen and got your very first credit card. Yikes! So, after careful consideration, you realize you don't want to risk it (yes, RISK it) and will go for a nice Toyota instead of that Porsche you had your eye on. This entire thought process is actually an example of risk management.

This is one of thousands of other situations where we use risk management without even realizing it. Yet, the team at the Solar Dynamics Observatory knows what they're doing, down to the very last setback and consequence, even though, as Brent Robertson states, "Issues will always occur despite implementation of a Risk Management process."

Panel: Project Management Roundtable

By Alicia Baker

The Project Management Roundtable had the following speakers:

David Gilman, *Associate Director for Project Execution, NASA Langley Research Center*
Lew Felton, *Vice President, Perot Systems*
Matthew Landano, *Director, Office of Safety and Mission Success, NASA Jet Propulsion Laboratory*
Nicholas Chrissotimos, *Deputy Program Manager Sun Earth Connection (SEC) Programs/STEREO Project Manager, NASA Goddard Space Flight Center*
Caris Hatfiled, Manager, *International Space Station Program Integration Office, NASA Johnson Space Center*

Many project managers face the same issues-whether they work for NASA or private industry. Management issues relating to space flight programs can often be translated to other project management tasks. What are some of the most common issues faced in managing a space flight project? Successful project managers from NASA and private industry volunteered their knowledge at the Project Management Roundtable with Martin Davis acting as panel moderator. Highlights of their discussion and "lessons learned" are presented here.

How do you avoid the most common problems that managers face when dealing with a space flight project? Mr. Davis says that when you are first given a project, you must make sure that you and the customer agree on the scope of a project, the Level 1 requirements, and all the tasks that you need to do. Secondly, you need to ask yourself what are the key risk drivers in the design of the spacecraft? You need to consider how risks can affect schedule and costs. What are the options for mitigating risks?

A member of the audience asked, "What do you do about requirements above the minimum in a project?" Mr. Davis pointed out that goals should be separated from requirements. Project managers should work to the requirements and then spend resources to meet their goals. Mr. Davis commented, "If you meet your goals too, then that's great!" It helps if you clear all your requirements and goals with your customers ahead of time.

Mr. Chrissotimos stated that "better is the enemy of good enough." You don't jeopardize your resources to meet your goals. He agreed that you and the customer must come to an understanding.

Mr. Hatfield said that you can manage your customer's expectations by constantly defining your requirements. If you have a broad mission scope, like managing the Crew Exploration Vehicle (CEV) for the next 30 years, requirements come and go. This can be difficult to manage. It requires a good project manager with the necessary technical knowledge to handle.

How do you deal with the problems that you encounter as a project manager? According to Mr. Felton, it depends on where you are on the project management chain. First, you need to realize that you are going to have problems but that with "healthy skepticism," you can use tools to figure out which level needs to deal with them. In the past, project managers were "thrown into the pool". Thankfully, now there are project management tools and techniques that can be learned (from the NASA Project Management Challenge conference, for example), that help you deal with things when reality differs from your desired outcome. For example, are your costs falling behind in your project? How do you deal with it? The role of the project manager is to set directions and expectations for a project.

Mr. Gilman believes that you should try to prevent problems in the first place. He asks for a status report every week from his group. You can also try to avoid failures by asking yourself what are the major problems that typically occur when you have a space flight project? Are they software or instrumentation problems? Mr. Gilman conducted a study to try to determine which technical problems are more likely to occur. He found that there is no special area in which problems occur. Project management is like the "whack-a-mole" philosophy: you get rid of one problem and another one pops up. You never know in what area problems will occur. Any one problem can get you when dealing with space flight.

Mr. Landano pointed out that if you don't get the requirements right, your project can get off on the wrong foot. You go from Phase A to Phase B to Phase C in a project, but if Phase A and B weren't defined right in the first place, you may have to go back to "redo" or significantly modify the baseline design defined earlier. You then could be confronted with major issues and problems. If you get the requirements right in the first place, you reduce the prospects of uncovering significant design issues and problems later in the project lifecycle.

Sometimes when you have long projects in the space program, some of your people will want to move on to other projects. So how do project managers maintain continuity among people? Mr. Davis said that a lot of contractors will offer incentives to retain employees. They give out bonuses and offer tuition assistance for continuing education.

Mr. Felton pointed out that when organizations have to down size, project managers will try to keep the most compatible people with their project. First, as a manager, you have to be honest with your employees and tell them the facts of the situation. The worst thing you can do is to not say anything. Rumors could end up being worse than the facts. Secondly, it would be nice if you had money to offer people to stay! Ask yourself, what motivates you? Is it money? Why would you leave a long-term project? What is the "key that unlocks" the door and makes an employee stay with you? But if you do have to lose good employees, think about it positively! You will be getting "new blood" and fresh ideas. You may have to "make lemonade out of lemons".

Mr. Hatfield talked about how it is common in human space flight. to have long-term projects end and new projects take their place. For example, the Shuttle program will end in 2010 and the CEV will eventually take its place. You want your current program to be successful, but what do you do when your people want to start working on the new project? People feel they need to work on the newest project because it might mean job security. Ask yourself what skills will leave the project? The most talented people tend to leave, so how do you deal with this? How do you come to a balance? As a project manager, you have to convey that the new program will not be successful until the goals of the current program are reached.

Mr. Chrissotimos said that "the squeaky wheel gets the most grease". Whichever project manager screams the loudest will get the best people. Whenever you take over a project, you bring people you trust with you. However, when projects end, project managers will have to start cutting their staff. This can be a challenge because even though you have a good team, you have to let certain people go. As an example, if you no longer need an instrument manager, then you should reassign him or her to a different project that requires an instrument manager. It's the project manager's responsibility to find a position for those who are leaving.

When two project managers have different projects that require an engineer with the same skills, how do you retain the engineer for your own project? Mr. Landano felt that an agreement should be worked out among the two project managers, the line managers, and the engineer. Most project managers work with the same engineers through the launch and first major mission event for the project. Afterwards, if there are not enough positions and you have to reduce your work force, you should weigh the skills and the risks of whom you should keep and whom you should consider rolling off. You need to communicate up front with your engineers. Some engineers prefer operations, others prefer design. This needs to be considered when staffing projects. An agreement needs to be worked out among the engineer, the line managers, and the project managers.

These NASA and private industry project managers have provided good feedback in a "lessons learned" format that other project managers can use even if they don't work on a space flight project. As NASA transitions from the Shuttle to the Constellation program, project managers can use these lessons to smooth the transition. Instead of being "thrown into the pool", project managers can add these lessons to their toolbox so they can become better managers. Mr. Landano summed it up best by saying, "A good project manager gets the job done!"

The Meaning and Importance of Culture for Project Success - Lawrence Suda

By Simon Sarkis

Dr. Lawrence Suda, President/CEO of Management Worlds, Inc., presented "The Meaning and Importance of Culture for Project Success". Mr. Suda explains the beliefs, expectations, moral ethics, and cultural background constituting an organization's "core culture". Mr. Suda pointed out four types of core culture that frame and characterize every operational organization. The four core cultures are collaboration, control, cultivation, and competence.

Every organizational culture incorporates a set of beliefs, values, expectations, and assumptions defined and applied by its working members and leaders. Nevertheless, a structured and defined organization might consist of subcultures nourishing its main core culture. These subcultures grow proportionally to the relative size of the main organization, employee diversity, and the geographical location of the organization. Mr. Suda's concept, or "organization categorization" for project/program managers and functional (service pool) managers, is based on Dr. William E. Schneider's research work on organizational psychology published in 1994, titled "Why Good Ideas Fail: The Neglected Power of Organizational Culture".

Looking at the four main organizational cultures, a "collaborative" culture favors an atmosphere of harmony, inter-communication among project members, diversity, and synergy. The management style in this culture is democratic and seriously depends on experience records and the trust built among the members. The disadvantage of this type of culture might be its proneness to short-term thinking. Mr. Suda notes examples of collaborative cultures such as Southeast Hospital, Goldman-Sachs, and CRS Sirrine, known also for embracing and managing diversity.

A "control" culture organization favors standardization, discipline, stability, and order, but lacks in communication and personal involvement. Project members become ask-oriented and turn into bureaucratic officials. However, its advantages include proficient planning, realistic decision-making, and eventually gaining a dominant position in the market.

A "competence" culture defines an organization with a high level of capability and an objective of pursuing excellence. This culture focuses on setting high expectations, recruiting the best team, setting incentives for the purpose of motivating efforts, and offering a vision to others. Weaknesses for this type of culture can be an unsatisfiable leadership and an organization where winning becomes emotionally driven. To illustrate, Mr. Suda listed Citicorp, the Four Seasons Hotel, and Intel, known for setting high performance standards, encouraging creativity, and promoting individual accomplishments.

Last, a "cultivation" culture seeks potential growth, fulfillment, and enrichment for its team members. Management operates in a stress-free environment. Hence, decision-making encourages commitment, participation, and inspiration, and only requires the ability to adapt to the group. Its weaknesses could be an organization where projects may not always finish on time and a proneness for playing "favorites". 3M and Herman Miller are examples.

Finally, in order for a project manager to succeed, he or she needs to establish one strong and unified culture in his/her workplace, where it is possible for subcultures to grow and enrich the predominant culture. A successful project manager must ensure a unified goal for the team and clearly communicate the views and visions of the culture organization to the stakeholders and perspective employees. Unquestionably, "success" remains the only common desired outcome for all four of these cultures.

Observe the figure below and guess which one(s) is NASA's 2006 core culture?

Then, which culture in this figure describes best your workplace environment?

The Challenges Encountered and Overcome During the Development of the Space Shuttle Orbiter Boom Sensor System - Irene Piatek

By Katrina MacDonald

Ms. Irene Piatek, Manager of the Crew Exploration Vehicle (CEV) Government Equipment and Materials (GEM) Office, NASA Johnson Space Center, presented "The Challenges Encountered and Overcome During the Development of the Space Shuttle Orbiter Boom Sensor System (OBSS)." The International Space Station requires that maintenance be performed in space; therefore, a device was required to serve such a purpose. The Space Shuttle Orbiter Boom Sensor System (OBSS) would be used on the STS-114 mission, which led to a strict schedule for the project team to follow. The schedule was one of three variables that concerned the project manager. The others involved budget and resources.

In fact, the schedule proved to be the variable that had the greatest effect on the project but was the factor the project manager could least control. The team was originally given six months from the start of the project to flight. This obligated the team to produce a requirements document quickly. After one month of painstaking analysis, the document was delivered, giving the team a strong starting point.

The schedule also affected design selection. Two potential designs were considered without a discriminator between them. The first, a truss structure, was known to be a stable system. The second, a composite structure, could be produced from prefabricated parts. Therefore, it was decided that in the interest of time, the team should not build a new piece of equipment but rather build the composite structure.

Sensor design was also taken into account. These sensors were used for small damage detection on the Reinforced Carbon-Carbon (RCC). Two sensor candidates emerged. Although both had been flown before, neither had been used for the intended purpose of the current project. Because the Development Test Objective hardware had already been used, and time was still a great concern, the team intended to implement both sensors with only minor modifications. Through the course of the project, however, more changes became necessary to ensure a smooth integration.

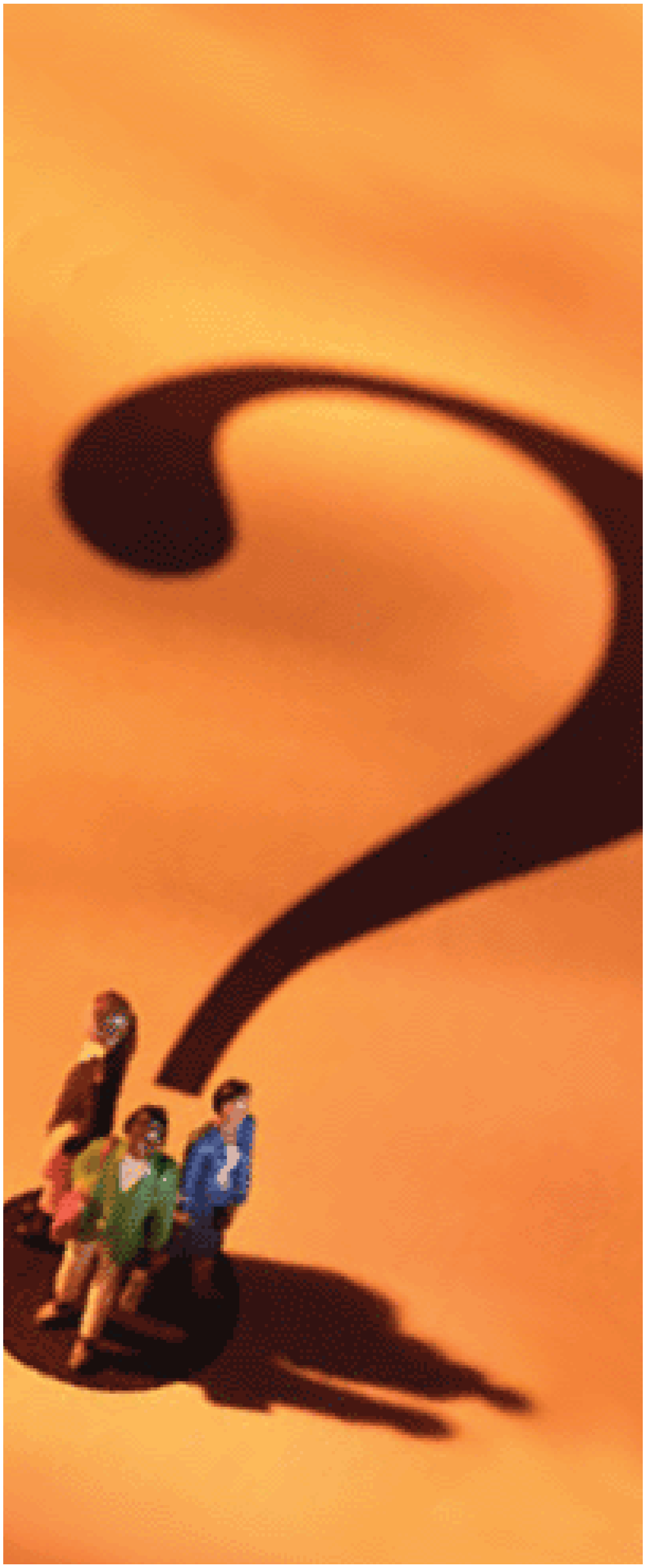
Maintaining smooth interaction among the large number of people involved in the project proved challenging for the project manager. Several major aerospace firms participated in the OBSS project, including United Space Alliance (USA), Boeing, McDonnell Detwiler Associates, Sandia National Laboratory, and Neptec. Each of these contractors contributed to different portions of the project and fell under the project manager's supervision. Communication, of course, was the key to a smooth operation. The large team was kept informed through Technical Interchange Meetings (TIMs) and telecoms.

Although communication in a timely manner was prized, a few surprises did emerge. Two weeks before the launch, new damage detection criteria were passed along requiring the sensors to be able to detect 0.02-inch-diameter holes. The team had been under the impression that the requirement was for the sensors to be able to detect holes with diameters as small as 0.25 inch. The new criteria were taken into consideration, and the hardware was set to accommodate the change.

The project manager ensured that all the right processes were followed despite the schedule constraints. A standard systems engineering approach, along with an obligation to adhere to a single integrated schedule, as well as individual schedules for each subproject, ensured that any issues would be resolved in a timely manner. The OBSS was designed for 30 missions and was designed and implemented in just under two years. The project was deemed a success due to careful planning and a determined project manager.

Can Troubled Projects Be Prevented? - Mina Samii

By Zohreen Khan



Dr. Mina Samii, Vice President of Computer Sciences Corporation, presented, "Can Troubled Projects Be Prevented?", and outlined the importance of preventing troubled projects by continuous and effective project management from the initial phases to the end of the project. Ms. Samii compared two projects: one that did not have many obstacles because of strong project management from start to end, and the other that had various constraints throughout the project. The presentation emphasized steps that can be taken to prevent troubled projects and how to overcome problems that occur during a project.

A successful project meets specific completion standards of deadlines, budget, acceptable quality, and customer satisfaction. Several factors indicate a project is in trouble. One sign of a troubled project would be customers who are unhappy, unsatisfied, and ready to terminate. All these factors are connected, and when one function is troubled on a project, other areas are affected just as much. A team with low morale and which feels its work is inefficient are other signs of a troubled project. Other signs include missing deadlines, being over budget, and unhappy management. Some root causes of a trouble project relate to project definition, planning, execution, and reporting. A project manager must set the tone and standards right from the start on what needs to be accomplished and determine expectations for the project in its early stages.

Ms. Samii explained how to manage projects for success using the "Triple A's" through the project. Project managers must use awareness, anticipation, and action continuously to be a good leader. The project manager should reinforce the "Triple A's" to the team and all other stakeholders.

There are specific success enablers in each process of the project. During the planning process, enablers such as having a well-defined project, well-planned and controlled budget and quality, and measurement criteria are signs of strong preparation. Having corrective actions and improvements recorded and tracked would be essential throughout all project execution and decision-making. It is fundamental to document throughout the project. Continuous feedback between peers and management regarding areas for increased efficiency or needed improvements is crucial.

When a successful project using the "Triple A's" is delivered, the project is on schedule, within the budget requirements, and well supported. It is mandatory for project managers to apply effective processes in order to prevent troubled projects from occurring. Project managers are encouraged to do things right the first time and apply the principles of awareness, anticipation, and action in all project areas.

Cost Estimating Initiatives in NASA Project Management - David Graham

By Leif Anderson

Mr. David Graham, Program Analysis and Evaluation/Cost Analysis division for NASA Headquarters presented "Cost Estimating Initiatives in NASA Project Management". Based on a 2004 General Accounting Office (GAO) investigation on NASA budget performance, a proactive approach has been adopted in order to mature organizational processes relating to cost and risk. Yet in the interim, data collection has remained an area for improvement. NASA's goals are to revise, educate, and implement policy that facilitates project data collection and dissemination.

A significant point of Mr. Graham's talk showed how a project is managed using Continuous Cost-Risk Management (CCRM). The CCRM cycle is divided into 12 steps that cover defining requirements and a Work Breakdown Structure (WBS) to mapping cost curves and data modeling for inclusion with Cost Analysis Data Requirements (CADRe) and One NASA Cost Engineering (ONCE) documentation. In each step, risk assessment identifies trouble areas. This cycle repeats throughout the four phases in a project: the conceptual definition (Pre-Phase A), conceptual design (Phase A), preliminary design (Phase B), and design, development, test and evaluation (Phases C/D). The CCRM cycle is modeled from NASA Procedural Requirements (NPR) 7120.5C, "NASA Program and Project Management Processes and Requirements", and assists a project in complying with the directive's guidelines. Nearly all NASA project overrun the Budgeted Cost of Work Scheduled (BCWS), but the solutions to put a project on track exist in the CCRM and through reference of the Cost Estimating Handbook.

When assessing cost and risk, careful analysis is used to reconcile uncertainty. The Cost Estimating Handbook is a good primer to identify project attributes and variables that contribute to an accurate picture. Steps 4 and 5 of the CCRM specifically cover assessment and analysis for this purpose. Multivariate analyses combine cost and risk parameters to give an estimate of historical, correlative, and simulated data. The analysis is supported through confidence and probability distribution for values of each iteration. Mr. Graham's presentation included a compelling series of slides showing the behavior of the s-curve confidence distribution with "good risk management". As each slide progressed, so too did the project phase and a confidence level distribution that locked onto an increasingly narrow cost range. This series illuminated a tendency of risk evaluation to become more inelastic as the project progressed - an incentive no doubt for sound risk management. The series might benefit from a corresponding-curve showing confidence levels.

Certain parameters place estimates in the right value range and in total, provide an increasingly accurate estimate. Project characteristic templates exist to enhance model-resolution such as element-oriented Key Engineering Performance Parameters (KEPPs). Other templates such as Key Management Characteristics and Key System Engineering Characteristics provide organizational breakdowns for resource estimation. Uncertainty for high-risk activities is critically important to overcome.

Oversight of cost estimation initiatives is intended to improve data collection at NASA. Cost Performance Report (CPR) Data Requirement Descriptions (DRDs) provide oversight instructions for managing certain project activities deemed high-risk elements in the WBS. Control through traditional level-three reporting uses two reporting methods: 10% variance reporting and High-Risk No-Threshold Variance Reporting. Each DRD investigates variance trips or targeted activities in the WBS by moving down levels. Once the source is found (or a contingency decided) the project manager is given a set amount of time to correct the problem until variance is back within an acceptable range, measured by a higher level work package. The check contributes to a safer investment overall for systems engineering and represents a portion of the "revise" policy for cost estimation and risk management at NASA. Once complete, the cycle begins again.

Basic Schedule Analysis Techniques - Walt Majerowicz

By Michael Tu

Mr. Walt Majerowicz, PMP, is a Senior Manager at Computer Sciences Corporation. He is also the PAAC (Program Analysis and Control) Integrated Program Team Leader at NASA Goddard Space Flight Center. In his presentation, “Basic Schedule Analysis Techniques”, Mr. Majerowicz introduced several approaches for assessing the health of project schedules. With these schedule analysis techniques, a project can evaluate the realism of its baseline schedule, evaluate performance, and even forecast future performance by using past data.

Mr. Majerowicz defined schedule analysis as “the process of determining the integrity of the schedule baseline, evaluating schedule results, and assessing the magnitude, impact, and significance of actual and forecast variations to the baseline and/or current operating schedules. It includes the recalculation of the critical path and the determination of any change in the completion date of the project.” As we can see from this definition, schedule analysis is a powerful tool for project management. It not only identifies project schedule management problems, but also forecasts the potential variations in the future.

A big challenge for any new project is setting deadlines. However, with the “Critical Path Analysis” and “Monte Carlo Analysis” tools presented by Mr. Majerowicz, predicting the project’s likely finish date becomes possible. While the critical path identifies the current “long pole” for completing the project, it is only one of many possible outcomes. By simulating the many possible schedule completion date outcomes using Monte Carlo analysis, a fuller understanding of the confidence in finishing by a specific date is quantified. This provides a richer understanding of schedule risk, and aids the project manager in planning an adequate schedule reserve.

Project logic networks can be very large, often with thousands of activities and milestones. Mr. Majerowicz illustrated the “Project Control Milestone Method” as a technique for summarizing the overall project schedule plan, actual performance, and forecast-to-complete, based on a set of significant milestones identified from the project logic network. This technique helps the project management team focus on the “big picture” from a schedule perspective, and could augment Earned Value reporting to achieve a fuller sense of overall project performance.

Mr. Majerowicz also discussed sources of risk in the schedule. For example, the more predecessors there are to an activity, the more events there are that could affect an activity’s planned start date. Therefore, an activity with numerous predecessor activities may be a candidate for including a schedule reserve to mitigate possible delays due to problems with a predecessor. Other sources of schedule risk could include “poor or unrealistic activity duration estimates”, “inadequate or incorrect resource planning”, “insufficient schedule reserve”, “external factors”, “poor performance”, “improper or poor change control”, and other factors.

Finally, Mr. Majerowicz summarized, “with schedule analysis, project success is enhanced”. Some of the most beneficial outcomes include: “determining if the objectives can be accomplished on time”, “monitoring the adequacy of schedule slack and reserve”, “assessing the likelihood of potential schedule problems”, “identifying project schedule priorities”, “evaluating the effect of new scope changes”, and “understanding the cause of schedule problems, their impact, and the corrective action needed to avoid them”.

Associate Contractor Agreements and the International Space Station: A Success Story - Mary Kerber

By Alesia Anderson

Ms. Mary Kerber, Director of Contracts for Barrios Technology, Ltd., presented “Associate Contractor Agreements (ACAs) and the International Space Station: A Success Story”. After including Associate Contractor Agreements (ACAs) requirements in many prime contracts for nearly 20 years with varying degrees of success, the NASA Johnson Space Center (JSC) and the International Space Station Program (ISSP) have implemented a new approach. By paying attention to the lessons learned in the past, NASA has found the keys to success:

1) consistency in the contract provisions,

2) an award fee criteria focusing on implementation of the ACAs, and

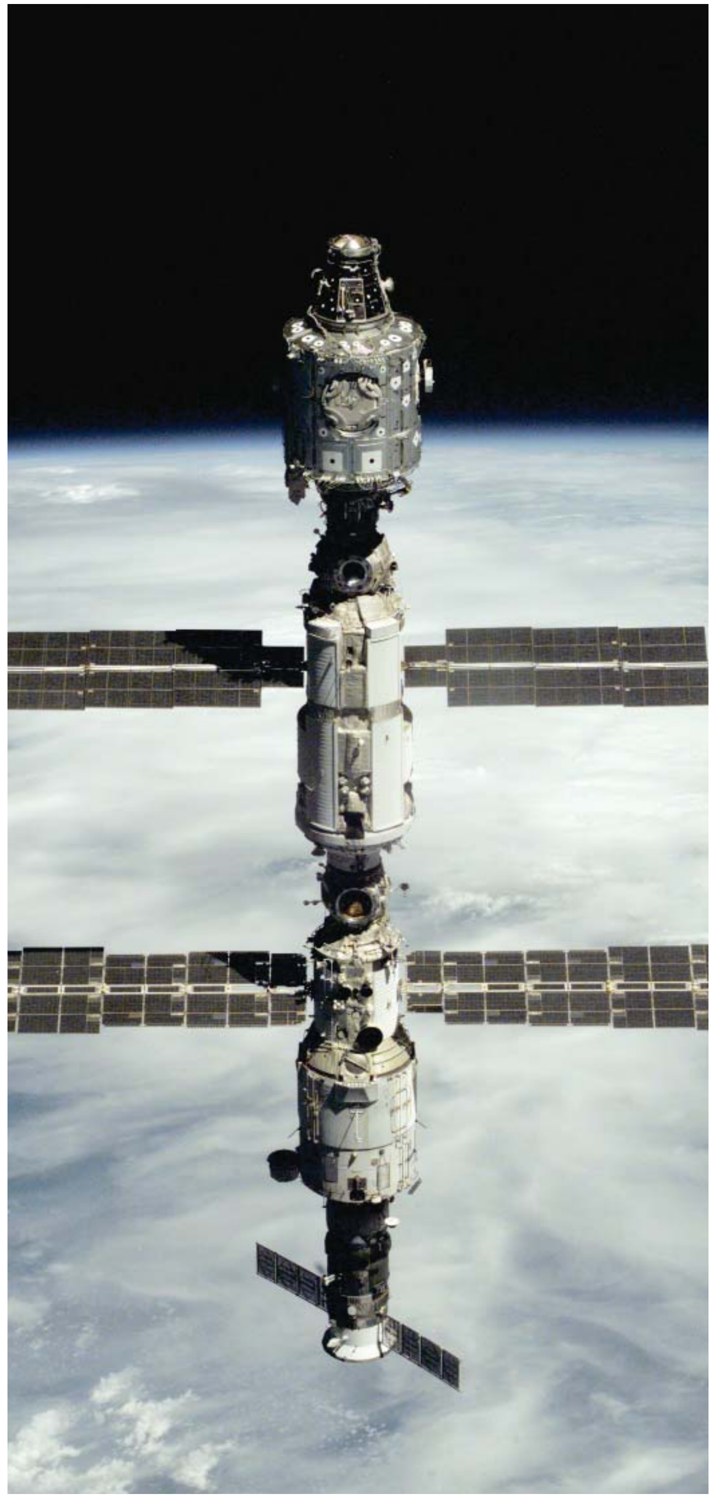
3) close coordination between the Contracting Officers and Contracting Officer’s Technical Representatives (COTRs) of all impacted prime contracts.

This new approach (new at least from a NASA standpoint) is yielding impressive results in terms of the smoothness of the transition from a single prime to multiple prime contracts and in the formation of teams composed of all prime contractors to address program-wide process improvements.

Ms. Kerber, shared the success of the International Space Station (ISS) because of its use. The ACAs allow contractors and NASA to work together, creating an open work environment where each side can share information. The contractors are evaluated on how well they work together as a group. This type of approach to managing contracts is a continuous work process improvement.

The ISS program manager’s role in the process is to understand the progress of the group and to initiate cooperation from both sides. Throughout the process, the contractor project managers may be called upon to attend steering committee meetings. The meetings inform the project managers of the status.

Overall, ACA implementation has led to greatly improved communication and data flow between prime contractors dependent on each other’s products and is focusing now on process improvements that promise to yield great benefits in terms of efficiency as well as cost savings.



Case Study: Ice Mitigation on Shuttle Return to Flight - John Muratore and Ed Rogers

By A. Frank Thomas

Mr. John Muratore, Lead Engineer for Space Shuttle Program Office at NASA Johnson Space Center and Dr. Edward Rogers, Knowledge Management Architect for NASA Goddard Space Flight Center, presented "Case Study: Ice Mitigation on Shuttle Return to Flight". The case study series was slightly different from the other programs presented at NASA's Project Management Challenge. Rather than using a lecture format, the presenters of the case study actually placed the participants in the shoes of NASA program managers. The participants were furnished with a short document outlining a project management problem from recent history, and they were instructed to discuss the situation among themselves. The participants then voiced their individual decisions regarding the problem, and the presenters reviewed the responses as well as the actual decision that had been made on the issue.

The Case Study focus was on mitigation of ice debris from the Space Shuttle's external tank's liquid oxygen feedline forward bellows. The report furnished for the study identified the risk of ice debris buildup on this bellows, which could not be insulated with foam due to its flexibility. The report discussed the efforts to reduce ice buildup on the bellows, including a "drip lip" that showed some results in testing but had not yet been proven and validated for the Return to Flight. Another method developed for ice mitigation in this area was to install a heater at the bellows. At the time of the case study, it was not clear whether the heater would be required, as the "drip lip" was still being tested. Installation of the heater would require removal of some of the tank's insulating foam, which would have to be reapplied. Also, installation of the heater would inevitably cause a delay in the launch schedule.

The main question, therefore, before the participants in the case study, was whether the external tank should remain at the Michoud Assembly Facility for heater installation or whether it should be shipped to Kennedy Space Center with the option of installing the heater if the "drip lip" alone did not prove effective in testing. Holding the tank at Michoud for heater installation would delay transport to Kennedy Space Center; alternatively, the work could be done at Kennedy, where it would be more difficult. The benefit to the latter option was that any launch delays would be avoided if the heater turned out to be unnecessary.

Most of the participants favored the cautious approach of installing the heater at Michoud, where trained technicians in familiar facilities would leave the least room for error or complications. Many, however, decided to ship the tank immediately to Kennedy, choosing to keep to the launch schedule until it became clear that the heater would be needed.

A great number of factors influenced this thought process. First was the actual risk to the safety of the Space Shuttle. Also considered were the political and program risks resulting from launch delays. Important to this discussion was an appraisal of known risks versus unknown risks. Modifications to the external tank might have unpredicted effects.

One of the greatest lessons from this case study was the importance of making a decision and sticking with it. It was clear from reading the case study that either option could be made to work, perhaps with additional time taken in case of unforeseen circumstances. Still, the options must be weighed and one chosen according to what served the program best. As it turned out in the real case, the external tank was shipped to Kennedy without the heater installed. When NASA decided that the heater was needed, engineers attempted to install it there. However, there were so many complications from this task that the next tank in line at Michoud was eventually used for the Space Shuttle's Return to Flight. That tank had a heater installed at the forward bellows while at Michoud. This real example demonstrates how plans can be changed to adapt to new problems.

This case study was a valuable exercise in project management decision-making. The "hands-on" approach was an effective tool for showing how management decisions are made, and how they can affect a project. The two presenters who led the discussion gave valuable, informed insights to help the participants in the case study. Overall, this presentation was a valuable part of NASA's Project Management Challenge.

A Formula for Fixing Troubled Projects: The Scientific Method Meets Leadership - Sandra Wagner

By Simon Sarkis

Ms. Sandra Wagner, Deputy Project Manager for the International Space Station Crew Quarters project at NASA Johnson Space Center, presented "A Formula for Fixing Troubled Projects: The Scientific Method Meets Leadership," she described her experiences in taking over troubled projects and how using a methodical approach, like the scientific method, can help identify and correct root cause problems.

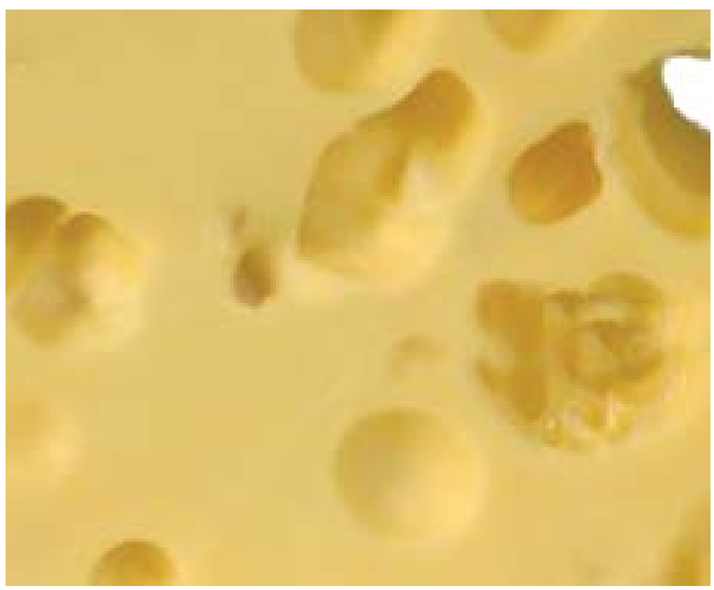
Ms. Wagner presented two of the troubled projects she managed: "Sampling and Analysis Plans for Containerized Mixed-Waste" and "Computerized Maintenance Management System Software". She illustrated by analogy how scientific methods can be used to solve project problems. To solve a problem, managers can use methods similar to those used for solving a simple physics problem:

- Read the problem
- Diagram the problem
- Determine the question
- Determine what data is provided
- Determine what mathematical formula to use
- Determine what data is missing
- Collect the missing data
- Solve the problem
- Check your work

In "Sampling and Analysis Plans for Containerized Mixed-Waste," Ms. Wagner discovered that plans were falling behind and the project was under budget. She also noticed a regulatory noncompliance risk facing the team and the stakeholders. While diagramming the scope of the problem, the previous manager had focused on analytical chemistry techniques. By discussing with her customer their needs, Ms. Wagner learned that the real objective was to characterize the waste to enable its treatment. After defining the project plan algorithm, it was time to identify and incorporate the stakeholders in the activities along with adding new teams of experts to "fill in the gap" (e.g., chemists, radiation safety personnel, technology developers, etc.). A next major step was to execute the project, establish performance baselines, and use earned value management, developing corrective action plans when appropriate.

In her second example, "Computerized Maintenance Management System Software" Ms. Wagner oversaw the revision of software used to manage a maintenance delivery system. Observing the history of the software implementation and the team members, Ms. Wagner remarked that changing the paradigm continues to be one of the key challenges facing large companies. The difficulties encountered in this case were exacerbated by the resources for the project being diverted to operational changes, leaving none to invest in changing the software, inaccuracies in the existing database, and inappropriate maintenance plans, along with a work control team that embraced the legacy software and process. Challenged yet cheerful, Ms. Wagner secured her cheese (meaning resources or property that are valued, according to Ms. Wagner), and set her vision, which she characterized as "high performance aircraft on autopilot". The team's objective became to create a user-friendly, reliable, timely facility (equipment maintenance and repair). After securing the resources (technicians, programmers, database, and budget), missing data was evaluated. Resources were allocated, experts were assigned to the project, and the project was reorganized to address the software interface, the database, and the processes. A major component of the project was to facilitate major culture change to allow changing the product, the way of operating, and the software.

Ms. Wagner showed outstanding management skills in the supervision of both tasks by breaking down the project into manageable activities and carefully evaluating the progress to prevent surprises. Ms. Wagner, as a result of implementing her methodical approach, helped refocus the team and set a common goal, as well as improving the way other tasks, such as budgeting and scheduling, were performed. In a last remark to her listeners, Ms. Wagner advised every leader to look at the big picture, embrace changes, and certainly use the project management toolbox effectively. Concluding, she noted: "The supreme quality for leadership is unquestionably integrity. Without it, no real success is possible..." - Dwight D. Eisenhower



Care and Feeding = Project Success - Anne Martt

By Katrina MacDonald

Ms. Anne Martt, Vice President and Constellation Program Manager at United Space Alliance (USA), presented “Care and Feeding = Project Success”. The success of a project depends upon the amount of time and attention the project manager is willing to pay. Perhaps the equation “Care + Feeding = Project Success” can be used as a recipe to reach that goal.

The case study was about the Cockpit Avionics Upgrade (CAU), a beleaguered project with its third project manager. Ms. Martt, the third and final project manager, discussed the problems and issues the project faced.

The project faced challenges requiring careful planning, thorough analysis, and, in some cases, the replacement of team members. Budget and schedule planning was integrated, and the project manager analyzed the plans from the “ground up”. This ensured that realistic goals were set. The project manager also reassigned the system engineer, various Integrated Product Team (IPT) leaders, and took on a full-time risk manager. Ms. Martt replaced team members only out of necessity. For example, particular technical knowledge was required for the project even to be considered. The CAU needed not only the installation of new hardware and software but also the integration of the new equipment and operating system into both the flight and ground infrastructures. It was essential that the system engineer be highly experienced and knowledgeable in all areas.

The system engineer, each IPT lead, and the risk manager all reported to the project manager to keep the channels of communication open. Communication became crucial to the success of the project and important to Ms. Martt. On one occasion, she felt she was not receiving an adequate response from a team member. This caused her to work her way through the chain of command and over to the individual’s manager, who then spoke with the employee about how often he was sharing information with the project manager. This tactic effectively ensured communication among team members.

Anne Martt made a point of using tools such as an Earned Value Management System (EVMS). Although this was the first time EVMS was used at USA, she ensured that the team had sufficient training. The project manager even made a point of reviewing each Cost Performance Report. This located issues early that would not have been discovered in any other report.

Another obstacle the project manager faced was the autonomously acting hardware vendor. The vendor and other subcontractors were integrated into various IPTs, and a project representative spent three of every four weeks on location to provide prompt feedback to the project manager. One week of every month the primary employee would be covered by another team member on-site to continue work in the primary representative’s absence.

Ms. Martt understood that her full attention was required for the CAU to be completed successfully. She made sure she had a thorough understanding of the schedule, budget, and various risks at every level. She removed individuals from leadership roles and placed them where they could be of better use. She communicated with every member of the team through frequent emails, held Monday morning meetings with the IPT leaders, and kept a close relationship with the subcontractors. Ms. Martt even rewarded the team members for their contributions. She set a goal of hosting one after-work party per quarter. She found that using company awards for exceptional team members boosted the confidence and morale of the employees. Although it was cancelled, Anne Martt turned this struggling project into a great success. Of NASA’s ten programs analyzed in-depth in 2004, the CAU was rated number one in Project Management.

Making Decisions - Doing that Voodoo that You Do - Leon Swartz

By Jamin S. Greenbaum

Mr. Leon Swartz, Engineering Staff, Space Operations Development, United Space Alliance, LLC (USA), presented "Making Decisions – Doing that Voodoo that You Do." Admitting that purchasing stock in the ill-fated energy company, Enron, in 1999 was a "bad" decision, Mr. Leon Swartz is quick to concede that good decision-making can be difficult. With the exception of a few "no-brainers", decisions are risky and should be approached with effective tools to help choose wisely. By answering the fundamental question "what makes a decision a 'good' decision", and introducing the methodical approach to decision-making he calls "PrOACT", Mr. Swartz offered important tools and a new perspective on an art essentially important to project management professionals. Important traps and pitfalls of decision-making were also introduced in his discussion.

What makes a "good" decision? Is it one in which you "applied a 'good' process regardless of the result"? Is it a choice made where "the outcome was what you thought it should be"? Or, is a "good" decision one in which "the outcome resulted in a 'Win-Win' position for everyone"? As it happens, none of the above responses are considered correct in this discussion. According to Mr. Swartz, the two characteristics of a good decision are that "you can live with it today and you can live with it tomorrow", and that "it is consistent with your ethical and moral beliefs". Regardless of the consequences, it is his belief that a good decision should never violate either of these two tenets.

Five fundamental facets of effective decision-making are included in the "PrOACT" method: problem, objective, alternatives, consequences, and tradeoffs. The decision-making process begins with the problem statement, and much care should be taken to create a written statement that is clear and concise yet not overly constrained. A problem statement that is too narrow may automatically eliminate alternatives that may have been superior had they been known and available for investigation.

Once the problem statement has been properly established, the objectives, or the desired results, of the decision should be clearly established. On this step of the process, Mr. Swartz adds two important observations. First, he notes that objectives are the rationale behind decisions one may have to explain or defend at a later time. Also, it is through stated objectives that one may determine how much time and energy a particular decision deserves–it is never worth spending your entire life making a decision!

A list of alternatives is fundamentally important in the decision-making process but is also highly susceptible to poorly or even unintentionally imposed constraints limiting the choices. It is therefore important to actively challenge constraints and eliminate mental barriers that would not allow the discovery of superior solutions to a problem.

Once alternatives and objectives have been established, they can be related to one-another through their consequences. A "Consequences Table" is a practical tool for analyzing objectives and alternatives by mapping out all possibilities in a logical, tabular workspace. Through example, Mr. Swartz demonstrated how this workspace can be used to analyze consequences and perform tradeoffs for an important, multi-faceted decision. He introduced the "Even Swap" method as the solution to making effective decisions with multiple objectives. In this method, consequences are ranked based on how well each satisfies the given objective. Those that best satisfy the objective are superior or demonstrate dominance. Those least satisfying the objective are inferior or least dominant. "Bartering" would be used to weigh the importance of alternatives against each other if one alternative does not clearly demonstrate dominance over the others.

As a caveat in his discussion, Mr. Swartz discussed the five most common decision-making traps and pitfalls: anchoring, status quo, sunk-cost, confirming evidence, and framing. By describing these five challenges and giving examples of each, Mr. Swartz illustrates that the most thought-out decisions are still subject to limitations. He concluded his lecture, however, by discussing the next step of the process once a final decision is made: execution. It is at this stage that the decision must be sold to all concerned parties and then implemented; while making the decision is part of the game, it is useless unless it is properly implemented. Finally, it is important to remember that the decision-maker is always responsible for the consequences of his or her decision "When you own your choices, you own their consequences." - Jack Welch, *Winning*

The Evolution of Project Management: Are We Getting Better? - Hugh Woodward

By Alesia Anderson

Mr. Hugh Woodard, managing editor of PM Forum, presented "The Evolution of Project Management: Are We Getting Better?" There have been projects since the beginning of time. We can see evidence of this by looking at the Great Pyramids of Egypt. Back then they did not have automotive tools and processes of project management; however, they did know they had to begin and finish a project. Mr. Hugh Woodard explored past projects to evaluate if we are getting better at the project management process.

For example the project team for the 2002 Olympic Winter Games realized that the project was going to end up with a $100 million deficit. The solution to this problem would be easily resolved by reducing the scope of the project. The project team did the exact opposite. They asked the question, "How can we alleviate this problem by gaining more revenue?" The answer was to put additional seats in the stands, advertise more, and gain extra profit by selling more tickets. This philosophy worked. The project ended up with a profit of $400 million. The key to success for this project was profitability.

Organizations and project teams need to go beyond seeing project cost and schedule as the determining factors to project success. The customer is the ultimate judge to the success of a project; therefore, the real key to project success needs to be evaluated by enhanced revenue, increased productivity, operating efficiency, and customer satisfaction.

So, are we getting better at the project management process? We are meeting deadlines and meeting budgets because we have the tools to do so, however, the key to project success is meeting the customers' needs. According to Mr. Woodard, organizations must align projects to the needs of the customer and corporate strategies of the business in order to evolve and improve the project management process in the future.

Project Management: Who is Doing it Right and What are the Key Practices? - Jay Hoover

By Michael Tu

Mr. Jay C. Hoover, Senior Project Manager at NASA Johnson Space Center, presented "Project Management: Who is Doing it Right and What are the Key Practices?". He is a frequent NASA speaker at industry project management conferences. Mr. Hoover has 38 years experience in various phases of quality management of the facility project delivery process. In Mr. Hoover's presentation, he introduced the key practices of project management improvements. He started by pointing out the major facets of project management, and further presented actual approaches to improve the likelihood of project success.

Mr. Hoover first gave us some background about the American Productivity & Quality Center (APQC). The APQC is a non-profit organization that studies the best practices of top-performing organizations, and benchmarks business performance to help organizations improve quality and productivity. APQC also provides advisory services in knowledge management and process improvement. Its mission includes connecting through membership, consortia, and alliances; disseminating by publishing, training, and coaching; and, discovering through consortium studies and client support methodologies. APQC membership is extremely diverse and includes all kinds of industries from engineering to forest products, and pharmaceuticals to petroleum. With its diverse membership, APQC can collect precise information in its benchmarking study area.

Secondly, Mr. Hoover introduced the application of the "Project Management Process Maturity Model". The model is used to evaluate the efficiency of project management performance. It consists of five categories representing the maturity level of the project management process. From level 1 to level 5, the corresponding definitions are: "Basic PM Process, Individual Project Planning, Systematic Project Planning and Control, Integrated Multi-Project Planning and Control, and Continuous PM Process Improvement". At the higher levels, teamwork becomes stronger and team performance becomes more efficient.

Finally, Mr. Hoover presented "the best practices of project management" that help enhance the techniques of project management. The best practices can be summarized in four points: "Focus on the Process, Focus on the People, Manage Knowledge, and Customer Care."

Focus on the Process: "Focus on the process in the key part of our business that makes us successful at facility project management." This practice "eliminated project 'stove pipes' and implemented front end loading and teaming skills best practices." Among those, front end loading is exceptionally important because it controls the flow of the project.

The practice of front end loading identifies critical elements within the scope definition package, and, at the same time, predicts potential project risks. As a result, before starting any project, it is critical to select the right team and clearly define mission objectives. After that, we further define needs, requirements, and objectives for the project process and arrange roles and responsibilities for individual groups.

Within the fundamental setting of the project, we start to evaluate the financial plan to make sure the project should proceed through the budget cycle. By following the above practices, it is much easier to set up the project and also improve project success.

Focus on the People: During the process of project building, we should always focus on the project team. Mr. Hoover listed several key issues: "the approach to management, language processing, personal conversation, understanding variation, seminars, study groups, case studies, participation with team, and benchmarking." In my opinion, as a project manager, it is wise to ask the teams to find out where potential problems are. Therefore, we should always focus on our own people for pursuing continuous project improvements.

Manage Knowledge and Customer Care: In most cases, a big project involves a large number of components. To control project efficiency and outcome quality, "knowledge management" becomes a significant factor, including "process management" and engineering and construction innovation". As to customer care, Mr. Hoover pointed out that "a good project manger will never ignore the voice of customers." In my opinion, the voice of the customer determines the absolute direction of the project. Any successful project outcome depends upon customer satisfaction.

Lessons We Never Learn - Humboldt Mandell, Jr.

By Jamin S. Greenbaum

Dr. Humboldt Mandell, Jr., Principal Investigator for The University of Texas at Austin Center for Space Research, presented "Lessons We Never Learn". What will it take for the United States to send humans to Mars? Dr. Humboldt C. Mandell believes that NASA must make sweeping cultural changes to be successful. Without these changes, it will be difficult to achieve the President's Vision for Space Exploration within the proposed timeline, if at all. "Lessons We Never Learn" was an enlightening lecture developed from years of research, Dr. Mandell discussed the four overall "themes" that have come about for NASA through years of a ccumulated lessons-learned. The first theme, that NASA lacks effective implementation of lessons-learned and is known to un-implement "hard-won lessons", is especially frustrating because many problems have been and will continue to be repeated unnecessarily. That the structure and management of NASA contracts promotes cost growth, and that the NASA bureaucratic management organization is, as a whole, inefficient, are offered as the second and third themes, respectively. The fourth and final theme, that "programs should only begin when there is a balance between technical content and readiness, schedules, and budget availability and support", is a difficult but necessary problem to solve for a technology-based organization such as NASA. Dr. Mandell discussed why change has not yet occurred and what he thinks can be done to help.

Lessons learned concerning NASA's management culture have been found and are well documented. In addition, Dr. Mandell and several others have reviewed NASA's corrective action history spanning 30 years, and have conducted an exhaustive set of research interviews to determine how successful programs operate. The interviews targeted both government and non-government project and program managers from inside and outside the space industry; they looked for representatives of every successful project that they could find. It was quickly determined that many lessons learned have been printed and available for many years, all showing a repetition of the same themes and stories. The research group determined that NASA's lack of adaptability and change has not been for lack of information but for lack of dedicated and responsible implementation and follow through. Of the 17 large-scale published corrective action reports, 11 resulted in absolutely no follow-up or implementation, four resulted in selective adoption of recommendations and partial implementation, and two resulted in formal follow-up and partial implementation. To make matters worse, according to Dr. Mandell, many recommendations that were implemented have since been un-implemented due to "cultural spring-back".

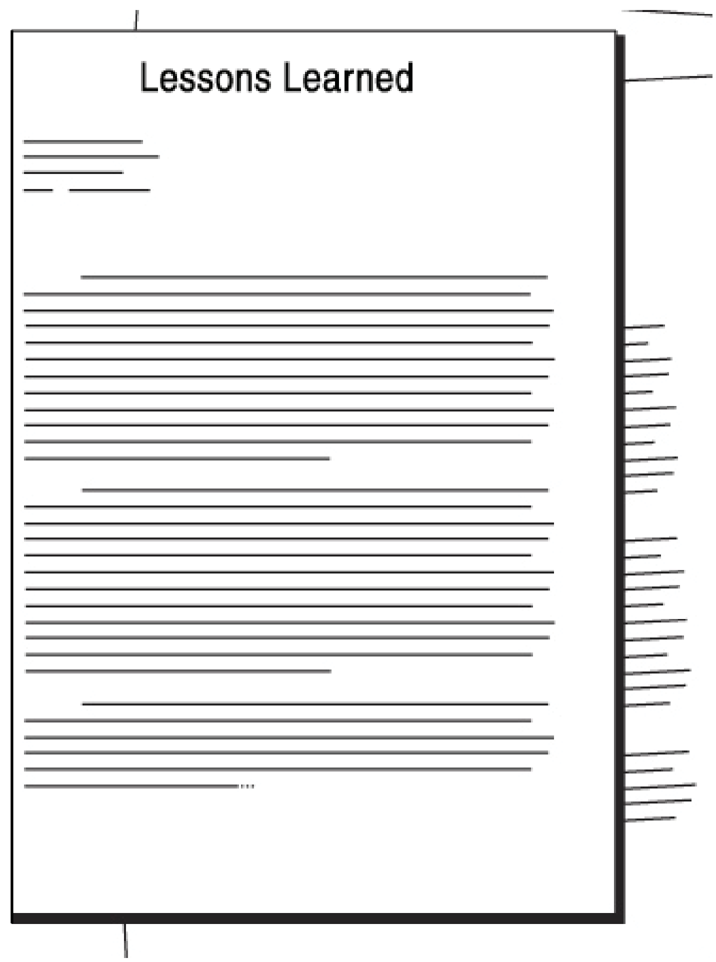
Poor management and structure of NASA contracts has been a well known problem through the years and it is essential that something be done if NASA is to accomplish more with the resources at its disposal. As Dr. Mandell stated, the structure of current contract management is "upside-down", giving contractors "no incentive to save money but every incentive to spend money". NASA, by specifying how to achieve results instead of focusing on product performance, usually finds that costs spiral out of control. Because this is

the source of so much loss, however, if this problem is fixed, restructured contract management can provide "the largest potential leverage for change and management gain within the space cultural paradigm". The many ways to properly "incentivize" contractors and fix the NASA/contractor relationship are known and documented; NASA must now take the initiative to effect this change.

The complex NASA organization is an interesting combination of technology-development and large-scale bureaucracy working together to maintain a high-profile and inherently high-risk enterprise. Dr. Mandell believes that this has resulted in unclear delegation of authority and responsibilities that, when combined with a geographically dispersed group of agency centers, results in a "bureaucratic management organization, structure, and style [that] does not promote efficiency and innovation." Dr. Mandell pointed out that, whereas NASA's primary core value today is safety, "when we organized this agency, we were an agency of risk-takers…but now, accidents we've had have resulted in [NASA] becoming more and more risk-averse." He went on to explain that one side effect of risk-aversion is a bureaucracy that will naturally expand and consume increasing resources. Dr. Mandell explained that NASA currently rewards engineers for the number of people they supervise rather than how much work is accomplished in their group. Therefore, in the current system, a manager would be unlikely to claim he or she can do a particular task with fewer people because the current system would not reward the effort as much as if more people were being supervised.

Most NASA programs find themselves under routine, cyclical, and often intense political pressure over the course of their lifetimes. One damaging result of this system is a tendency for programs to begin before they are ready. This is such a common problem that Dr. Mandell commented to a packed audience of NASA and contractor program managers that, "I expect there isn't anyone in the room who hasn't been associated with a program that has gotten into trouble because of an initial buy-in…an initial underestimate." Dr. Mandell related a personal experience from his long career with NASA where the Space Shuttle program was stuck at its peak funding level for over two years waiting for the shuttle main engine to complete its development. In research interviews with successful corporate program managers, Dr. Mandell learned that a product is not competitive if it takes more than three to five years to get to market. He asserted that because NASA does not have any competition, new products can take 10 to 20 years to develop.

Adopting cultural change within NASA will be a difficult process but the rewards will make the effort worthwhile. Proponents of change would like to see NASA's organization type move to the left of the "Relative Development Cost" curve given in Dr. Mandell's presentation. As this occurs and management of the agency begins to resemble that of the tactical missile or aircraft industries, for instance, the resulting cost savings will allow this nation to achieve more than is possible today with fewer resources. Given how entrenched NASA is in its current management culture, effecting the cultural changes necessary to affordably send humans to exciting new destinations will likely be as complex as the technologies used to get them there. Calling for change to an established culture is a difficult thing to do but, as Dr. Mandell quoted at the conclusion of his lecture: "If you do what you've always done, you'll get what you've always got." - W. Edwards Deming



Improving Outcomes on Experimental Projects - Lee Fischman

By Zohreen Khan

Mr. Lee Fischman, Special Projects Director for Galorath Incorporated, presented “Improving Outcomes on Experimental Projects.” He characterizes an experimental project as one that is uncertain in several ways and has constraints on various factors. Mr. Fischman presented his ideas on how experimental projects depend on creativity and discovery. In project management, there needs to be a setting for experimental projects.

Factors of discovery and learning mean to create multiple teams and permit competition. Teams need be diverse to encourage different perspectives. Through these diverse teams, shared learning and knowledge-transfer result to help the project. These teams should be cross-functional to openly and effectively communicate the processes in decision-making for the project.

Creativity is basic to hands-on capital building. Ways to set grounds for creativity include sufficient training, tools, and lectures. There should be cross-training and a buddy system for encouraging knowledge-sharing. Personal projects should be supported. A dedicated staff and management support is necessary for generating creativity in an experimental project. Mr. Fischman mentioned how 3M encourages creativity toward all its employees. Employees are given time at work to think and generate ideas for new experimental projects. The 3M hit product, Post-It, was a result of this active encouragement for creativity.

A dynamic environment opens pathways to communication. Open communication is needed in experimental projects. Frequent meetings and ample, effective feedback and reviews in experimental projects helps project managers know where they stand. Leaders should lead by wandering around. Following up is crucially important in all areas of the experimental project. The continuous communication flow between management and teams will aid in developing the experimental project.

Discovery and learning opens pathways to a dynamic environment. Dynamic environments are goal-oriented and maintain extensive open communication. Idea labs and physical share spaces are beneficial in dynamic environments. Mistakes should be considered as learning experiences.

In experimental projects, management has a crucial role in being supportive and open to give feedback. Management should enhance project efficiency. There needs to be a horizontally structured management style to prevent a strong bureaucracy from forming. Strong interpersonal relationships help in keeping communication between management and subordinates flowing well. Training and knowledge-sharing should be encouraged. People need to coordinate their work by planning and considering all constraints and optional steps if needed.

Mr. Fischman explained how maintaining roles in experimental projects clearly states job responsibilities and tasks to help the workflow. Leaders should keep an open-door policy and guide the team. Improving experimental projects means that communication channels are built up, environments are dynamic, management is enabling, and planning for project success is keen.

Applying Lean Principles to the Risk Management Process - Steven Waddell

By Alesia Anderson

Mr. Steven Waddell, Vice President of Strategy for Reed Integration, Inc., presented "Applying Lean Principles to the Risk Management Process". Risks are associated with all aspects of our lives. We encounter them when driving a car, cooking food, taking care of our kids, and even when relaxing on the beach. Living life is all about managing risks.

As a project manager or project team member, we must realize the importance of managing risk within a project. A risk is any uncertainty related to a project. As a project team member, you want to increase the probability of a positive risk and decrease the probability of a negative risk. The risk management process is a systematic and realistic way to control your project by decreasing uncertainties.

Mr. Waddell explained how project teams could ultimately increase project success by applying lean principles to the risk management process. In order to apply the lean philosophy, Mr. Waddell made three assumptions:

1) there is an existing risk management process in place,
2) there is room for improvement in the process, and
3) organized leadership is responsive and supportive of the change.

The lean philosophy will reduce or eliminate excess waste in the risk management process and create value for all stakeholders.

Mr. Waddell said that customer perspective defines value added, therefore the risk management process must focus on adding value for the customer; anything that does not add value for the customer is waste. "Research has shown that, in general, 95 percent of all activities related to a given process do not add value to the product."

To apply the lean philosophy, an organization must individually evaluate the steps within the process to eliminate waste. The risk management process consists of:

- Risk management planning
- Risk identification
- Qualitative analysis
- Quantitative analysis
- Risk response planning
- Risk monitoring and control

Eight business wastes can be identified within one or all steps of the process: underutilized people, no value added processing, over-production, transportation, waiting, excess motion, defects, and excess inventory. For example, if the risk management plan does not include a clear risk owner (the person who is responsible for watching out for a certain risk), then it is underutilizing people and creating waste in the process.

By applying lean principles to the risk management process, organizations can create and maintain validity within the process.

Collaborative Project Management: Unleashing the Potential of Cross-Functional Teams - Tim Kelley

By Alesia Anderson

Mr. Tim Kelley, Principal Consultant for Collaborative Leaders, Inc., presented "Collaborative Project Management, Unleashing the Potential of Cross-Functional Teams". Unleashing the potential of cross-functional teams can be a difficult job within an organization. Mr. Kelley, gave insight on how organizations could use collaborative teams to face business projects.

Mr. Kelley identified three problems facing cross functional teams:

1. Technical complexity – complicated technical problems and solutions
2. Social complexity – distributed decision making, diverse backgrounds and perspectives, variety of means and channels of communication
3. Wicked problems – problems that do not have a definite answer to them

Technical complexity, social complexity, and wicked problems create fragmentation in teams. As a result, 30 percent of nformation technology-enabled projects never come to a fruitful conclusion (Gartner Group), 70 percent of Business Process Redesign (BPR) projects fail (Malhotra), and 74 percent of U.S. workers over the age of 18 are not engaged in their work (Gallup).

Collaboration is a system for leading, managing, and working; it is built on the principles of ownership and alignment. Mr. Kelley suggested that collaboration builds ownership in all, aligns people to operate in the same way and/or toward the same end, focuses people on end results rather than concentrating on work processes, and allows group decision-making that can lead to better solutions. The diagram below illustrates the collaborative work environment.

By creating a collaborative work environment, organizations can deal with the combination of technical complexity, social complexity, and wicked problems; create greater engagement and commitment among team members; improve inter- and intra-team communication; and, create better solutions than through traditional methods.

An Integrated Risk-Management Framework: Introducing the Triple-Triplets Concept for Safety and Mission Assurance - Feng Hsu

By A. Frank Thomas

Dr. Feng Hsu, Lead Engineer, Frontier Space Missions, presented "An Integrated Risk Management Framework – Introducing the Triple-Triplets Concept for SMA". Dr. Hsu began by pointing out the lack of integrated risk management in the Space Shuttle program, as described by the Columbia Accident Investigation Board. He stated that the complexity of the Shuttle Transportation System necessitates an integrated risk management process that combines hazard analysis with a probabilistic risk assessment in order to quantitatively rank hazards. A systems engineering approach would be used, centering Safety and Mission Assurance within the program as a closed-loop adaptive control process.

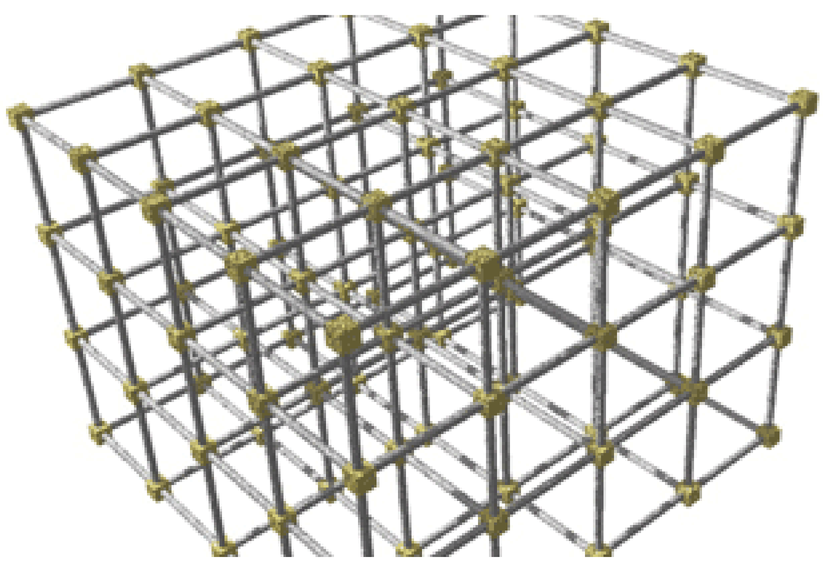
The Triple-Triplets Concept is based on an organization of system safety (hazard analysis), probabilistic risk assessment, and risk management (tradeoff decisions). The name of the concept arises from the three questions associated with each of these three steps.

The system safety triplets are: What are the hazards? What are the safety requirements and goals? What are the compliances and verifications that must be met? These questions identify and rank the system hazards and establish baseline safety requirements.

The risk assessment triplets are: What can go wrong? What's the likelihood that it would go wrong? What are the consequences? These questions help in establishing scenarios and quantifying the risks. This is where Probabilistic Risk Assessment (PRA) takes place.

Finally, the tradeoff decision triplets are: What's going on? What can be done? What's the impact? These questions represent a trend analysis, a trade-off study between the PRA and Hazard Analysis, and an assessment of current management decisions on future options.

Dr. Hsu stressed the importance of PRA the most. This seems to be the single most important tool for qualitatively ranking threats to overall system safety. Dr. Hsu also stressed the importance of in-house expertise to use the PRA most effectively. With all these steps combined, the Triple-Triplets provide an integrated framework for safety and mission assurance.



NASA Project Managers: Having the Right Stuff - Jerry Mulenberg

By Aleks Borresen

Dr. Jerry Mulenburg, a Senior Analyst in the Systems Management Office at NASA's Ames Research Center, presented "NASA Project Managers: Having the Right Stuff" during the Project Management Challenge conference on March 22, 2006. During his presentation, he spoke mainly about what superior project managers have that distinguish them from average project managers. Certain "habits", as Dr. Mulenburg calls them, were identified in superior project managers, among them integrity, honesty, commitment, and flexibility.

Dr. Mulenburg presented survey information indicating that projects failed primarily for two reasons: the project manager's lack of self esteem, or because of people. Furthermore, if project management is not mastered, one can expect a near 70 percent failure rate for projects.

There are several factors in mastering project management. Project managers can be trained for certain things such as knowledge, skill, and ability. However, some things cannot be trained, for example: willingness, motivation, and preference.

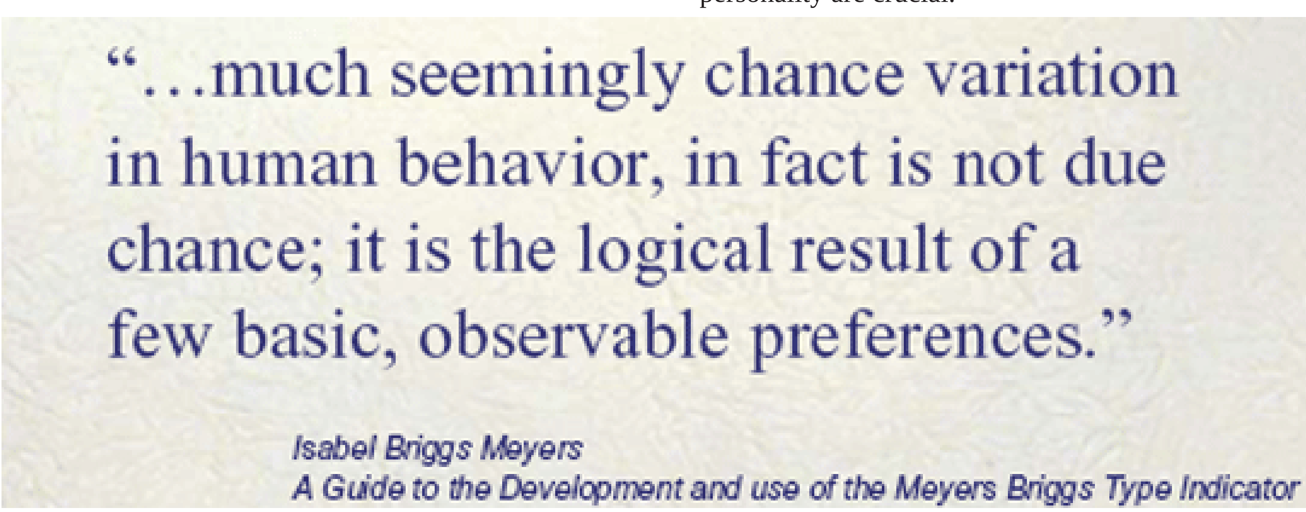
There are four things that superior project managers have. They are emotional intelligence, ego resilience, the right temperament, and personality. Personality is one of the top indicators of whether project managers will succeed.

Dr. Mulenburg uses the Meyers Briggs personality-type indicator to help identify the most desirable personality types in a project manager. The Meyers Briggs test uses four scales of preferences. Each preference works on opposing ends of a scale with its contradictory preference. The first personality preference is based on where one gets his energy, characterized as Introverted or Extroverted. The second preference is based on how someone prefers to gather information, being iNtuitive or Sensing. The third preference deals with how one prefers to make decisions, through Thinking or Feeling. Finally, the last preference categorizes how one prefers to relate to the outer world, by Judging or Perceiving.

When the 16 possible combinations of personality type are studied, it indicates a strange pattern. Among both male and female project managers at NASA, the majority are iNtuitive Thinkers (65 percent in fact), the most common types being Extroverted iNtuitive Thinking Judging (ENTJ) and Extroverted iNtuitive Thinking Perceiving (ENTP). This by no means says that if someone is not one of these types they should not go into project management. It merely states what types of people are generally found in NASA project management.

Three other characteristics affect project management performance: emotional intelligence, ego resilience, and temperament. Emotional intelligence is all about knowing one's self and being able to control emotions, as well as knowing what others need and how to get the desired response from them. Ego-resilient individuals do not fall apart when things go wrong. Therefore, tough ego resilience is desired. Temperament is the character of a person - what they are born with and what is learned throughout life. Rankings of temperament, along with emotional intelligence and ego resilience, are higher among female project managers studied than among the males.

This does not mean that any ENTP or ENTJ will make a superior project manager, or even that ISFP (Introverted ensing Feeling Perceiving) will make a poor project manager. It is simply an observation of the current population of NASA project managers and their similarities. In conclusion, if one desires to be a superior project manager, emotional intelligence, ego resilience, and the right temperament and personality are crucial.



Panel: What New Project Managers Need to Know but Were Afraid to Ask

By Michael Tu

The Panel consisted of the following speakers:

James Lewis, *Low Impact Docking System (LIDS) GFE Project manager for Crew Exploration Vehicle and Constellation, NASA Johnson Space Center*
Kevin Miller, *Deputy Project Manager Resources, NASA Goddard Space Flight Center*
Don Beckmeyer, *RS-68 Project Manager, NASA Stennis Space Center*
Ken Dolan, *Director of Operations for the Space Operations Institute, Capitol College*
Sam Padgett, *EVM Focal Point, NASA Johnson Space Center*
Richard Ryan, *Program Business Manager, NASA Goddard Space Flight Center*
Ken Schwer, *Project Manager, NASA Goddard Space Flight Center*
Therese Thrift, *Deputy Program manager, Lockheed Martin*

The main concern of new project managers in NASA's present climate is to maintain high efficiency in project processes in order to meet cost, schedule, and performance goals. Increasing pressure to meet these goals has been brought about, to a large extent, by the emerging international community. A panel of experts, introduced by James Lewis and Kevin Miller, addressed various ways to meet these goals.

Teamwork plays an important role in any project. Some big projects involve different groups of civil servants and contractors. Under these circumstances, teamwork becomes even more important. In order to maintain high efficient teamwork, we should put enough trust in the contractors. However, we also need to apply "checks and balances" to push the project's progress. Another challenge of project management is in the area of financial resources. Especially when funding is come from different organizations, the probability of a funding drop-off increases. We should be aware of this kind of issue. The last thing we should be considering is the viewpoint or agenda. People from different groups could have different agendas for the same project. For instance, in the same NASA project, the people from the ground system group could have a different agenda from the people from the spacecraft group. It is important to maintain the same agenda among different groups.

New project managers need to remember to give credit for good work. This approach inspires the project teams. Also, make sure the project plan is detailed and realistic so that each team member can follow it. Project managers should focus on schedule management and social skills, and let go of the technical details. It is always a good idea to let the team build its own schedule.

Communication is another key to good project management. A new project manager should develop the habit to "ask around" the project teams. This helps the manager to control the team's situation and could even detect potential problems at the same time. Another issue for communication is "talking in the same language". Many bad mistakes result from communication misunderstandings. While communication should exist within the project team, there should also be communication between the project team and the client because there can be quite a few discrepancies between what the customer wants and what the project team thinks the customer wants.

In conclusion, as Ken Schwer said we should always remember, "A successful project can only happen with the right people, in the right place, and at the right time."

Panel: What's Happening in EVM at NASA

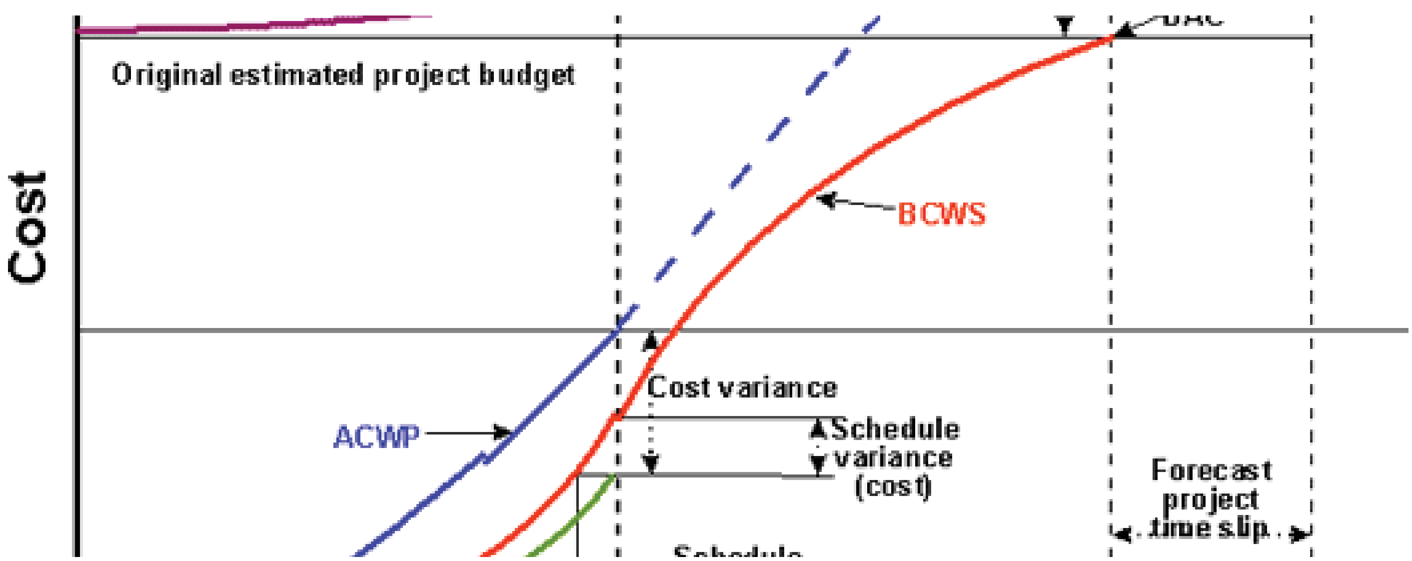
By Michael Tu

The Panel consisted of the following speakers:
Sandra Smalley, *NASA EVM Lead, NASA Headquarters*
Claude Freaner, *Science Mission Directorate, EVM Focal Point Council Representative, NASA Headquarters*
David Graham, *Cost Analysis Division, NASA Headquarters*
Jerald Kerby, *EVM Focal Point, NASA Marshall Space Flight Center*
Christopher Stock, *Program Analyst/ EVM Project Manager, Exploration Systems Mission Directorate, NASA Headquarters*
Dorothy Tiffany, *Program Business Manager, NASA Goddard Space Flight Center*

Representatives from NASA Headquarters, Goddard Space Flight Center (GSFC), and Marshall Space Flight Center (MSFC) met for a panel discussion on the impact agency-wide initiatives will have on implementing Earned Value Management (EVM). Half of the panelists who participated also serve on the EVM Focal Point Council, which facilitates a consistent, integrated approach to EVM across NASA and that there is agency-wide representation in EVM implementation. All members shared the view that EVM is an essential part of the Project Control Plan, but each offered a refined perspective of what a consistent and integrated approach entails.

The changes are directed toward guidelines for EVM compliance as stated in NASA Procedural Requirements (NPR) 7120.5C, "NASA Program and Project Management Processes and Requirements" (with reference to ANSI/EIA-748-A, "Earned Value Management System Guidelines"). The changes balance the diverse set of project types with the need for standardization and accountability. Among the changes, NPR 9501.3, "EVM Implementation on NASA Contracts," is rescinded. Full compliance with ANSI/EIA-748-A is rescinded for projects exceeding $50 million in total project cost. However, EVM principles are to be applied to all flight and ground support projects exceeding $20 million total project cost.

Various centers are at different stages of compliance but there remains a question of what method of standardization is optimal. This is due perhaps to the tendency of the seven broad ANSI EVM principles to break down as a standard when applied project by project. However, it is clear that the backbone of a robust EVM system is an organization's accounting practices. The Jet Propulsion Laboratory (JPL) is currently working through the final stages of validation with EIA-748-A.
The objectives for EVM at NASA are twofold:
1) implement standards that leverage NASA systems, and
2) provide a framework with enough flexibility to achieve project goals.
Given the current regulations, requirements, and guidance, the panelists indicated that pilot activities and programs are in place to identify best practices.



Student Perspective: In the Bag

By Sahar Rasolee

A sea of black and blue and white was all I could see for miles and miles around me. Okay, that's a bit of an exaggeration. The hotel suite was only so big. But, that room was completely covered with bags. One thousand bags to be exact. One thousand empty bags. One thousand empty PM Challenge 2006 bags. They were stacked on the floor, on the couches, on the chairs, on top of one another, on any surface available. Then, in the middle of it all, we had lined up the packets, brochures, pamphlets, papers, CDs, bookmarks, pens, and magnets that had to be distributed throughout the bags. Did I mention that it was one thousand bags?

With that, I started my first duty as part of the PM Challenge 2006 conference committee: stuffing conference bags. Our team had a sort of backwards assembly line set up -- we would all grab an empty conference bag and move along the line of papers and such until we'd filled up all one thousand bags. Instead of taking a few days, this process actually went so smoothly that we finished in a little under four hours! A major success! Maybe it was the VH1 music videos playing in the background, or maybe it was our own singing that helped the process move along. Or, just maybe, it was the competition to see who could stuff the bags the fastest that had us finishing so quickly. Either way, we got the job done efficiently.

Too bad we would still have to move all of these conference bags to behind the registration desk. That was a whole other production. Now, all of the goodies in the bag weighed them down so transporting the conference bags from one place to another became more challenging than I thought. The conference team banded together once again to pile the bags into boxes, then pile the boxes onto dollies, then take the dollies to the registration desk, and then line up the bags in the backroom. Multiply this process by four, and then add the breakdown of all those cardboard boxes. Whew, I felt I had accomplished something once all that was over!

I also really appreciated having the opportunity to be included in the conference. Ever since I started working for SGT, Inc., and the Program Analysis & Control (PAAC) contract at Goddard, my main job included managing contacts for the co-chairs of the conference, Dorothy Tiffany and Walt Majerowicz. I was give the chance to learn how to use ACT!, a software database of contacts and their information that we used when sending out the mass emails.

Then, during the conference, I met and recognized some of the people from our database. It made me happy to think I had been a small part of letting them know about the conference.

All in all, the hard work and teamwork led to an immensely successful conference, new friends, and a great sense of achievement.

PM CHALLENGE 2007

We hope that you have enjoyed PM Perspectives 2006.

Be sure to check the conference website at: http://pmchallenge.gsfc.nasa.gov for further information about PM Challenge 2007.

KNOWLEDGE SHARING

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